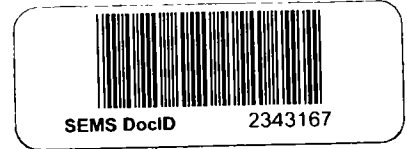


ORIGINAL
(Red)



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120



Bureau of Waste Management

Preliminary Assessment

FOR
ARCO Petroleum Products - Sludge Pond
PA #0781

2/24/90

City of Marcus Hook
Delaware County
Pennsylvania

ORIGINAL
(Red)

Site History

Preliminary Assessment, PA-0781, is for a site located in Trainer Borough in the town of Marcus Hook, Delaware County, Pennsylvania. The site and surrounding area are presently owned by B.P. Oil, Inc. In years past, Sinclair Petroleum (the original builder of the refinery in 1922) and ARCO Petroleum Products owned and operated the site. B.P. Oil purchased the property from ARCO Petroleum Products in 1969.¹

ARCO's 103(c) Notification, as required by CERCLA of 1980, identified the site as a landfill and an unknown facility which accepted "unknown wastes from petroleum refining and related activities." ARCO identified the site's waste handling dates as 1925 to 1969.²

B.P. Oil's 103(c) Notification differs significantly from ARCO's Notification. B.P.'s Notification states:

"all hazardous waste in the Refinery's sludge lagoon (impoundment 60,000 square feet) was removed in 1975. All waste (5,000,000 gallons of API separator sludge) was chem-fixed and sent to the Kinsley Landfill in Deptford, New Jersey. An additional 66,000 gallons of hazardous waste are located in several small pits (8,100 square feet total). These pits contain leaded tank bottoms."

B.P. identified the wastes as RCRA classified K051 and K052 waste materials. B.P. identified the site's waste handling dates as 1949 to present (June 9, 1981).³

Since telephone contacts with U.S. EPA personnel could not provide a site discovery form or additional information about the site,⁴ the writer based/conducted PA-0781 on the following:

1. ARCO's 103(c) Notification
2. Interviews with B.P. Oil personnel
3. Telephone conversations with ARCO personnel⁵

Therefore, PA-0781 is about a sludge pond or basin which held K051 (API separator sludge) waste material which was chem-fixed and the resulting material completely removed in 1975. PA-0781 will not address the K052 waste material identified by B.P. Oil as being located in several small pits. The writer feels that since this material was discovered through a separate 103(c) Notification, it should be handled through a separate Preliminary Assessment.

*It does not
make sense*

Present Site Conditions

At the present time, the former sludge pond is being used by B.P. Oil as an impoundment designed to contain contaminated runoff and overflows from B.P.'s API separator which may occur during heavy rainstorms.⁶

The impoundment was permitted by the PA DER Bureau of Water Quality Management in 1976 and operates under permit number 2376202.

The impoundment is designed for a 10-year storm; 2 inches rainfall per hour for one hour. Impounded water is then returned to B.P.'s waste treatment facilities via pumping on a controlled basis.⁶

Emergency overflows from the impoundment discharge to Marcus Hook Creek which is located immediately west of the impoundment. The overflow pipe is designed such that any floating oil in the impoundment will not discharge to the creek.⁶

Prior to the initial operation of the impoundment under permit number 2376202, a slurry wall around the entire impoundment was emplaced to a gneiss "bedrock".^{1 6} Information about the slurry wall is contained in the exhibit portion of this Preliminary Assessment. The only problem the writer sees with B.P.'s slurry wall is that the wall was emplaced to the weathered bedrock zone and not competent bedrock. This may result in the migration of contaminants through the weathered bedrock zone, i.e., beneath the slurry wall. *

Beneath the base of the impoundment, B.P. installed an underdrain system which conveys groundwater away from the base of the impoundment. Groundwater collected by this system is discharged to Marcus Hook Creek.⁶

A telephone conversation with B.P. personnel indicate that no known liner system, clay or synthetic, was emplaced over the base of the impoundment. It is believed that only a soil base was emplaced above the natural soil/bedrock. B.P. personnel, however, indicate that soil borings taken from the impoundment reveal a clay-type soil. It is uncertain whether this soil was "accidentally" emplaced or is naturally occurring.

Clean-up Procedures/Actions

The following several pages, taken from Exhibit C-2.0,~2.12 detail the phases of clean-up and elimination of the sludge pond.⁷

In short, chem-fixing is a chemical process where hydrocarbons become trapped in a lattice of strongly bonded chemicals. The resulting material does not leach hydrocarbons in rainwater.

PLAN OF OPERATION
SLUDGE LAGOON ELIMINATION
BP OIL, INCORPORATED
MARCUS HOOK REFINERY

ORIGINAL
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Phase I.

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill. Disposal will be at KinBuc landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase II

To be accomplished in conjunction with or shortly after Phase I. The parking lot area due west of the lagoon will be excavated to form a series of dikes to contain the Chemfix solids for curing. On both the lagoon and disposal area sides, diking will be arranged to collect any natural or liquid runoff in order that it may be diverted to the refinery oily waste sewer system.

All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the State's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills. An average of two feet of freeboard will be maintained. This specification prohibits the entire processing of the lagoon at

one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the lagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul-off sequence. Disposal of the Chemfixed material will be at Kinsley Landfill in Depthford, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above. This material will be disposed at KinBuc Landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Nature of Hazardous Materials

As previously stated, K051 (API separator sludge) waste material was disposed of at the sludge pond site. This is the only known material to have been disposed. K051 waste material is considered hazardous on the basis of its toxicity.

Routes for Contamination

In the writer's opinion, there are two (2) routes for contamination at the site; subsurface (groundwater) and surface water contamination. Of the two, groundwater contamination is considered to be the more significant.

Air contamination was not considered to be a contamination route due to the physical nature of the waste - an oily sludge.

Off-site soil contamination could possibly occur, but since B.P. Oil owns the surrounding land (the refinery encompasses the impoundment) it is felt that this is an insignificant contamination route and poses no threat.

The former sludge pond and present day waste water impoundment is monitored by four (4) groundwater monitoring wells. Three (3) of the monitoring wells are located outside the previously mentioned slurry wall, while one well (well no. 2) is located inside the slurry wall. Monitoring wells nos. 3 and 4 are identified as being background wells, while monitoring well no. 1 is identified as being downgradient.¹⁸

Review of groundwater data obtained from the on-site monitoring wells reveal:

1. "marked downgradient increases in C.O.D., ammonia nitrogen, and alkalinity. Iron and manganese are also elevated in downgradient wells.
2. Increases in alkalinity and ammonia would tend to indicate biodegradation of organics when viewed in conjunction with the elevated C.O.D. value this would suggest current or past contamination by hydrocarbons."⁹

Potentially Affected Population and Resources

Since the nearest well to the site has been reported as being (b) (9), no impact on surrounding wells is expected.

The local water authority for the Marcus Hook area is the Chester Water Authority. The Water Authority's supply source is (b) (9) from the site area, and therefore, no impact is expected on the supply source from the site.

Potentially affected resources around the site area are Marcus Hook Creek and the Delaware River. Assuming one could measure a contaminant release to these waters, only very minor release, if any, would be expected - the hazardous materials were all removed in 1975. Any contamination or degradation that is presently showing up in the monitoring wells is, in the writer's opinion, coming from present day activities and not past activities.

Conclusion/Justification

It is recommended that the ARCO Petroleum Products sludge pond (presently known as the B.P. Oil wastewater impoundment) be inspected on a time available basis - a low level priority assessment is recommended. Reasons for this are:

1. all hazardous wastes held in the sludge pond have been removed
2. the installation of a slurry wall around the entire sludge pond
3. installation of a groundwater monitoring program with reports submitted to the PA DER Bureau of Water Quality Management for review
4. no impact on the local water supply, and
5. minor impact, if the impact could be detected/determined, on Marcus Hook Creek and the Delaware River from the former operations of the sludge pond.

REFERENCES

1. Site visit/interview with Charles Barksdale, B.P. Oil, Environmental Engineer; 6/8/87.
2. Notification of Hazardous Waste Site Form; EPA Form 8900-1; ARCO Petroleum Products; 6/8/81, Exhibit B- 1.0-1.7.
3. Notification of Hazardous Waste Site Form; EPA form 8900-1; B.P. Oil, Inc.; 6/9/81; Exhibit B- 2.0-2.1.
4. Telephone conversation with Paul Racette; EPA; 6/10/87.
5. Telephone conversations with Rosanne Stevenson; ARCO Petroleum Products, Anaheim, California.
6. Application for Water Quality Management Permit, B.P. Oil, Inc.; Prepared 6/30/76; Exhibit C- 1.0-1.50.
7. Application for Permit for Solid Waste Disposal and/or Processing Facilities; B.P. Oil, Inc., Notarized 7/18/75; Exhibit C- 2.0-2.12.
8. Module 5A-Phase II Ground Water Quality Monitoring Information; B.P. Oil, Inc.; Prepared 4/29/77; Exhibit C- 3.0-3.3.
9. Memo from Paul Yaniga, Geologist, to John Kennedy, Sanitary Engineer; 6/21/77; Exhibit D- 1.0.

ORIGINAL
(Red)POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE 02 SITE NUMBER
PA 0781

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)		02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER			
ARCO Petroleum Products - Sludge Pond		Post Road			
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Marcus Hook	PA	19061	Delaware		
09 COORDINATES LATITUDE		LONGITUDE			
39° 49' 00" N		075° 24' 30" W			

10 DIRECTIONS TO SITE (Starting from nearest public road)

Proceed into the town of Marcus Hook, PA - Enter B.P. Oil Company and inquire within.

III. RESPONSIBLE PARTIES

01 OWNER (If known)		02 STREET (Business, mailing, residential)			
B.P. Oil, Inc.		P. O. Box 428			
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER		
Marcus Hook	PA	19061	(215) 499-7000		
07 OPERATOR (If known and different from owner)		08 STREET (Business, mailing, residential)			
ARCO Petroleum Products Company		1990 Crescent Avenue			
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER		
Aneheim	CA	92801	(714) 491-6844		
13 TYPE OF OWNERSHIP (Check one)					
<input checked="" type="checkbox"/> A. PRIVATE <input type="checkbox"/> B. FEDERAL: _____ (Agency name) <input type="checkbox"/> C. STATE <input type="checkbox"/> D. COUNTY <input type="checkbox"/> E. MUNICIPAL					
<input type="checkbox"/> F. OTHER: _____ (Specify) <input type="checkbox"/> G. UNKNOWN					

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply) B.P. Oil, Inc. ARCO Petroleum Products
☒ A. RCRA 3001 DATE RECEIVED: 8 / 18 / 80 MONTH DAY YEAR ☒ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: 6 / 8 / 81 MONTH DAY YEAR ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION		BY (Check all that apply)			
<input checked="" type="checkbox"/> YES DATE 6 / 8 / 87 MONTH DAY YEAR		<input type="checkbox"/> A. EPA <input type="checkbox"/> B. EPA CONTRACTOR <input checked="" type="checkbox"/> C. STATE <input type="checkbox"/> D. OTHER CONTRACTOR			
<input type="checkbox"/> NO		<input type="checkbox"/> E. LOCAL HEALTH OFFICIAL <input type="checkbox"/> F. OTHER: _____ (Specify)			
CONTRACTOR NAME(S): _____					
02 SITE STATUS (Check one) <i>Refiners active</i>		03 YEARS OF OPERATION			
<input checked="" type="checkbox"/> A. ACTIVE <input checked="" type="checkbox"/> B. INACTIVE <input type="checkbox"/> C. UNKNOWN		1925 1969 <input type="checkbox"/> UNKNOWN BEGINNING YEAR ENDING YEAR			

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Unknown wastes from petroleum refining and related activities. Suspect K051 (API separator sludge) material.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Potential for ground and surface water contamination.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Bruce Beitler	PA DER Bureau of Waste Management	(215) 270-1948
04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION
Chris Jaccarino	PA DER	Bur. of Waste Management
	07 TELEPHONE NUMBER	08 DATE
	(215) 270-1948	6 / 30 / 87 MONTH DAY YEAR

ORIGINAL
(Red)



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE 02 SITE NUMBER
PA 0781

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

See narrative

01 ☒ B. SURFACE WATER CONTAMINATION 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

See narrative

01 ☐ C. CONTAMINATION OF AIR 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ F. CONTAMINATION OF SOIL 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) 04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

ORIGINAL
(Red)



POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
PA	0781

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

01 ☐ K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION (include name(s) of species)

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

01 ☐ L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES
(Spills/runoff/standing liquids/leaking drums)
03 POPULATION POTENTIALLY AFFECTED: _____

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____)

☐ POTENTIAL

☐ ALLEGED

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e. g., state files, sample analysis, reports)

Same as Part 2, Section VI.



POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
----------	----------------

PA	0781
----	------

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES <i>(Check all that apply)</i> <input type="checkbox"/> A. SOLID <input type="checkbox"/> B. POWDER, FINES <input checked="" type="checkbox"/> C. SLUDGE <input type="checkbox"/> D. OTHER _____ <i>(Specify)</i>	02 WASTE QUANTITY AT SITE <i>(Measures of waste quantities must be independent)</i> TONS _____ CUBIC YARDS _____ NO. OF DRUMS _____	03 WASTE CHARACTERISTICS <i>(Check all that apply)</i> <input checked="" type="checkbox"/> A. TOXIC <input type="checkbox"/> B. CORROSIVE <input type="checkbox"/> C. RADIOACTIVE <input type="checkbox"/> D. PERSISTENT <input type="checkbox"/> E. SOLUBLE <input type="checkbox"/> F. INFECTIOUS <input type="checkbox"/> G. FLAMMABLE <input type="checkbox"/> H. IGNITABLE <input type="checkbox"/> I. HIGHLY VOLATILE <input type="checkbox"/> J. EXPLOSIVE <input type="checkbox"/> K. REACTIVE <input type="checkbox"/> L. INCOMPATIBLE <input type="checkbox"/> M. NOT APPLICABLE
---	--	--

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	5,000,000	gallons	API Separator Sludge
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

[illegible]

V. FEEDSTOCKS *(See Appendix for CAS Numbers)*

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

PA DER Regional Office Files; Interviews with B.P. Oil personnel; On-site visits; Telephone conversations with ARCO Petroleum Products personnel.

-14-

FIELD TRIP SUMMARY REPORT

ORIGINAL

(Red)
Page 2

C. Water supply for area. (CHECK ONE)

Chester Water Authority -
supply sources are located

1. Surface intakes (locate on attached map)

(b) (9)

2. Municipal wells (locate on attached map)

therefore, no impact on
local water supply is
expected.

3. Domestic wells:

a. Approximate number within 1/4 mile. -----0-----

b. Locate a minimum of 3 wells on attached map and list below:

Property owner -----

Address -----

Phone no. -----

Well records

YES --- NO ---

YES --- NO ---

YES --- NO ---

Odor problems

YES --- NO ---

YES --- NO ---

YES --- NO ---

Taste problems

YES --- NO ---

YES --- NO ---

YES --- NO ---

c. If odor or taste problems are reported please elaborate:

D. Are surface or subsurface, (leachate), drainage areas from site
apparent? YES --- NO X. If yes:

1. Were unusual odors or stains noted?

YES ---

NO ---

2. Was stressed vegetation noted?

YES ---

NO ---

a. If yes please note area on map.

E. Are streams or receiving waters adjacent to site? YES X NO ---

If yes, list observations: (i.e. - change in benthic community, change
in plant density/diversity, change in color, siltation, etc.).

Marcus Hook Creek adjacent to site - Creek receives overflows from

impoundment; however, overflow pipe is designed such that floating

oil will not discharge to creek.

F. Site topography: (i.e. - plateau, strip mine ravines, etc.).

Coastal plain

G. Other observations: (i.e. - erosion, located in floodplain, etc.).

FIELD TRIP SUMMARY REPORTPage 3

- V. Were photographs taken? YES --- NO -X-
If yes: Who has custody of photos?

Name: -----Agency: -----Phone No.: -----

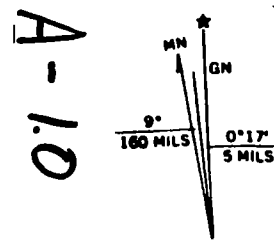
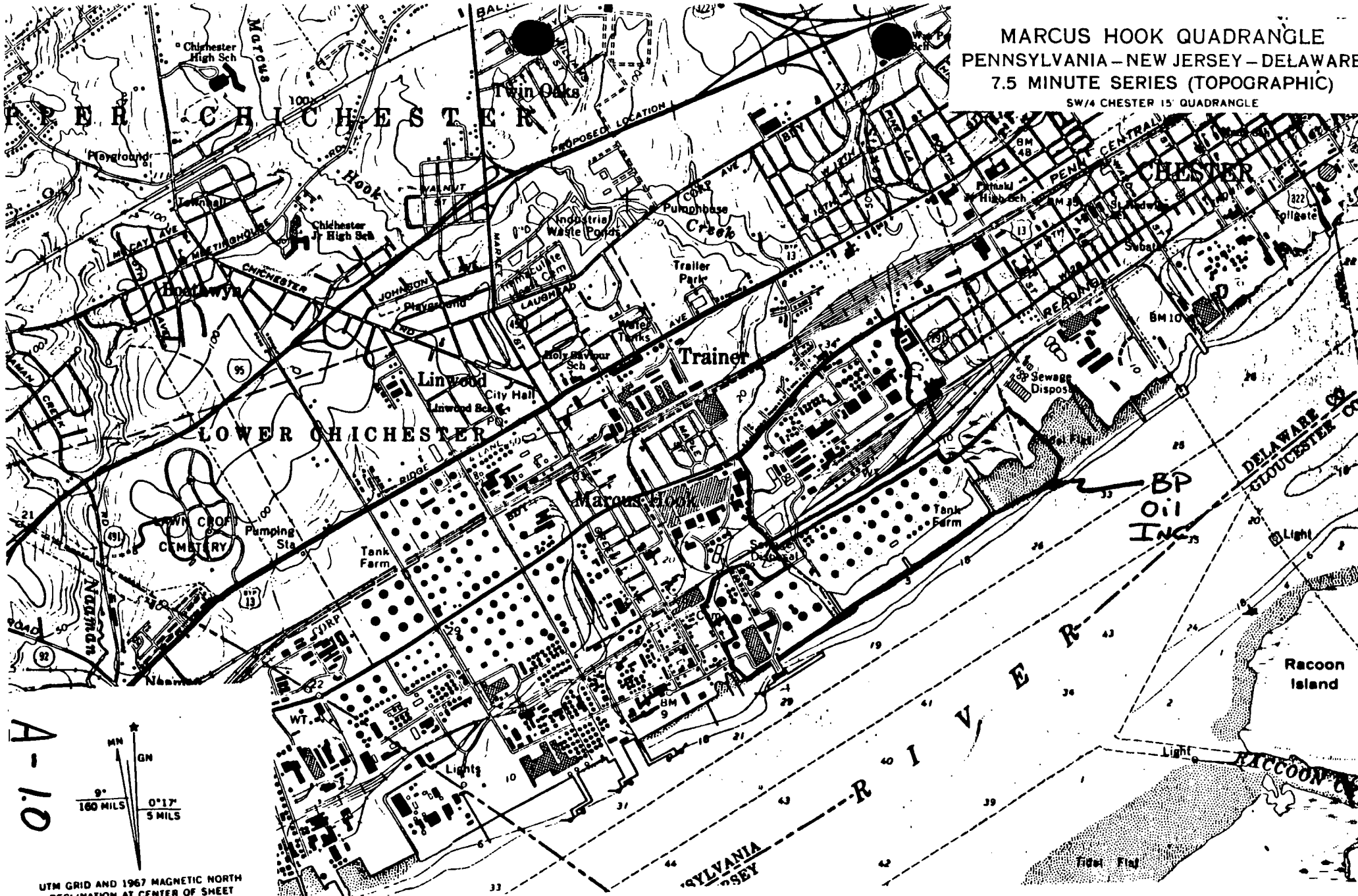
- VI. Is a hydrogeological survey for this site attached? YES --- NO -X-
If no, Section III D of EPA Form T2070-2 must be completed.

- VII. Please attach pertinent copies of reports or data reviewed by
inspector: (i.e. - State monitoring data, consultant reports, etc.).

- VIII. Name of Inspector: --Chris Jaccarino--

Agency: ---PA-DEP-Bureau of Waste Management---Phone No.: --(215)-270-1948--Time on Site: -6/8/87-9:30 a.m.--11:00 a.m.--Weather Conditions: --Sunny; hot (temp:~high 80's); humid--

MARCUS HOOK QUADRANGLE
PENNSYLVANIA—NEW JERSEY—DELAWARE
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 CHESTER 15' QUADRANGLE



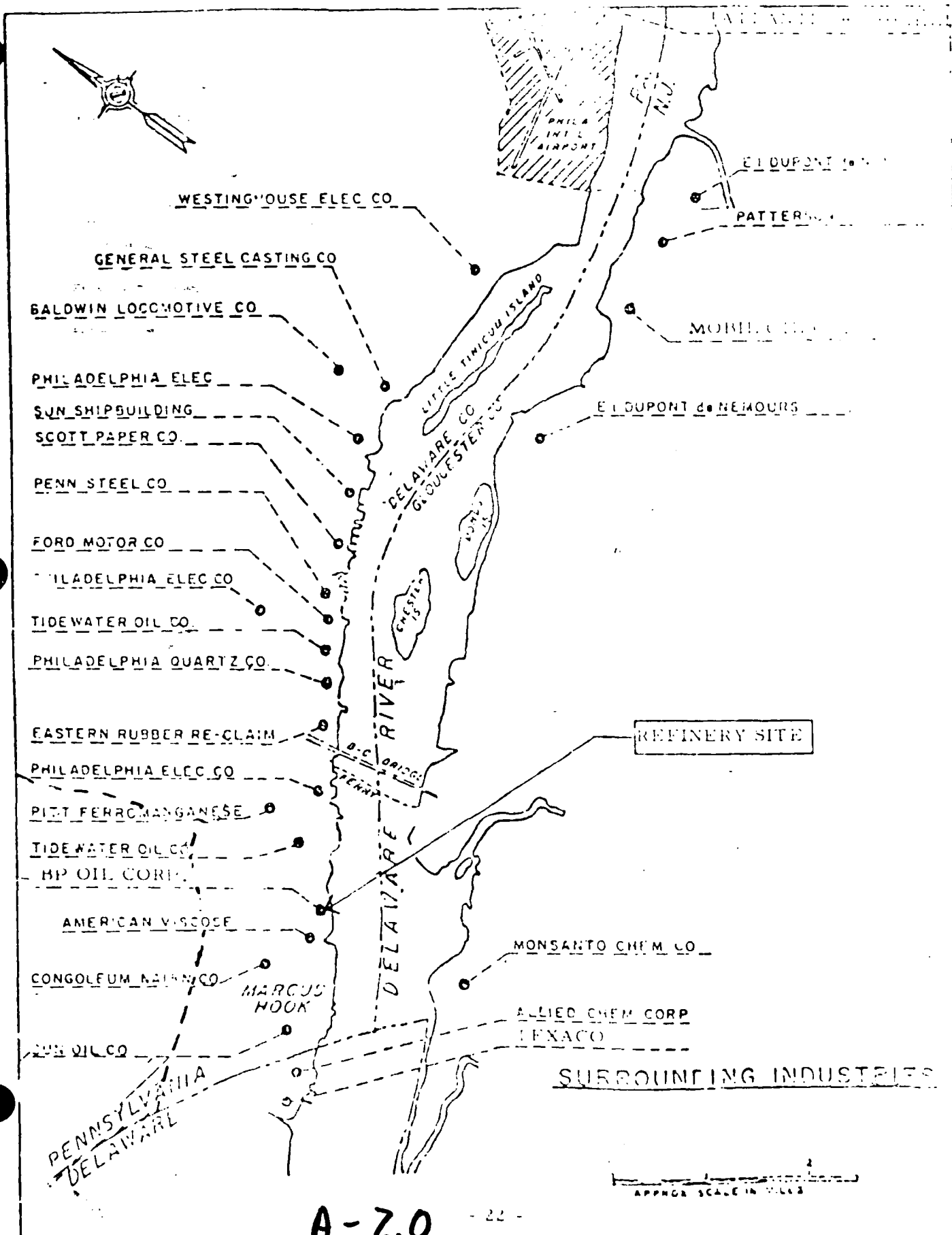
MARCUS HOOK, PA.—N. J.—DEL.
SW/4 CHESTER 15' QUADRANGLE
N3945—W75°25' 7.5

1967

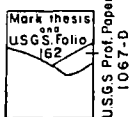
AMS 5963 IV SW - SERIES V831

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER

ORIGINAL
(Red)



SOURCE



EXPLANATION

- Q1
Trenton Gravel
- Tpb
Pensauken and
Bridgeton Fms.
undif.
- Xpg
Pegmatite
- Xa
Anorthosite
- Xmgh
Mafic gneiss,
hornblende-bearing
- Xmgs
Mafic gneiss,
pyroxene-bearing
- Xs
Serpentinite
- Xw
Wissahickon Fm.
oligoclase-
mica schist

REFERENCES

- Bacon, F., Clark, W. B., Darton, N. H., and others (1900). *Philadelphia folio, Pennsylvania-New Jersey-Delaware*, U. S. Geological Survey Geologic Atlas of the U. S., Folio 162, 23 p.
- Mark, L. E. (1977). *Petrology and metamorphism in the Marcus Hook quadrangle, southeastern Pennsylvania*, unpublished M.S. thesis, Bryn Mawr College.
- Owens, J. P., and Minard, J. P. (1970). *Upper Cambrian sediments of the lower Delaware Valley and the northern Delaware Peninsula, New Jersey, Pennsylvania, Delaware, and Maryland*, U. S. Geological Survey Professional Paper 1067-D, p. D1-D47.

Compiled by T. M. BERG and
A. A. SOCOLOW, 1978

MARCUS HOOK
(Pa.-N.J.-Del.)

A-3.0

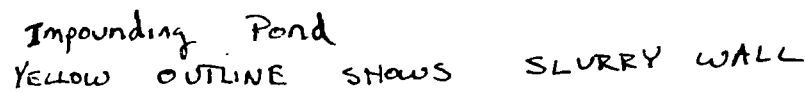
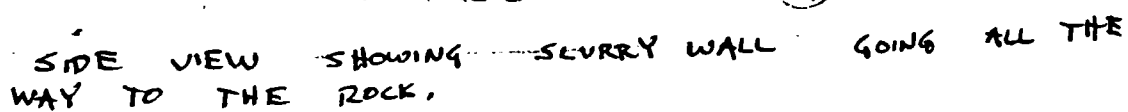


FIG. 2.



A-4.0

FIGURE 3

ORIGINAL
(Red)

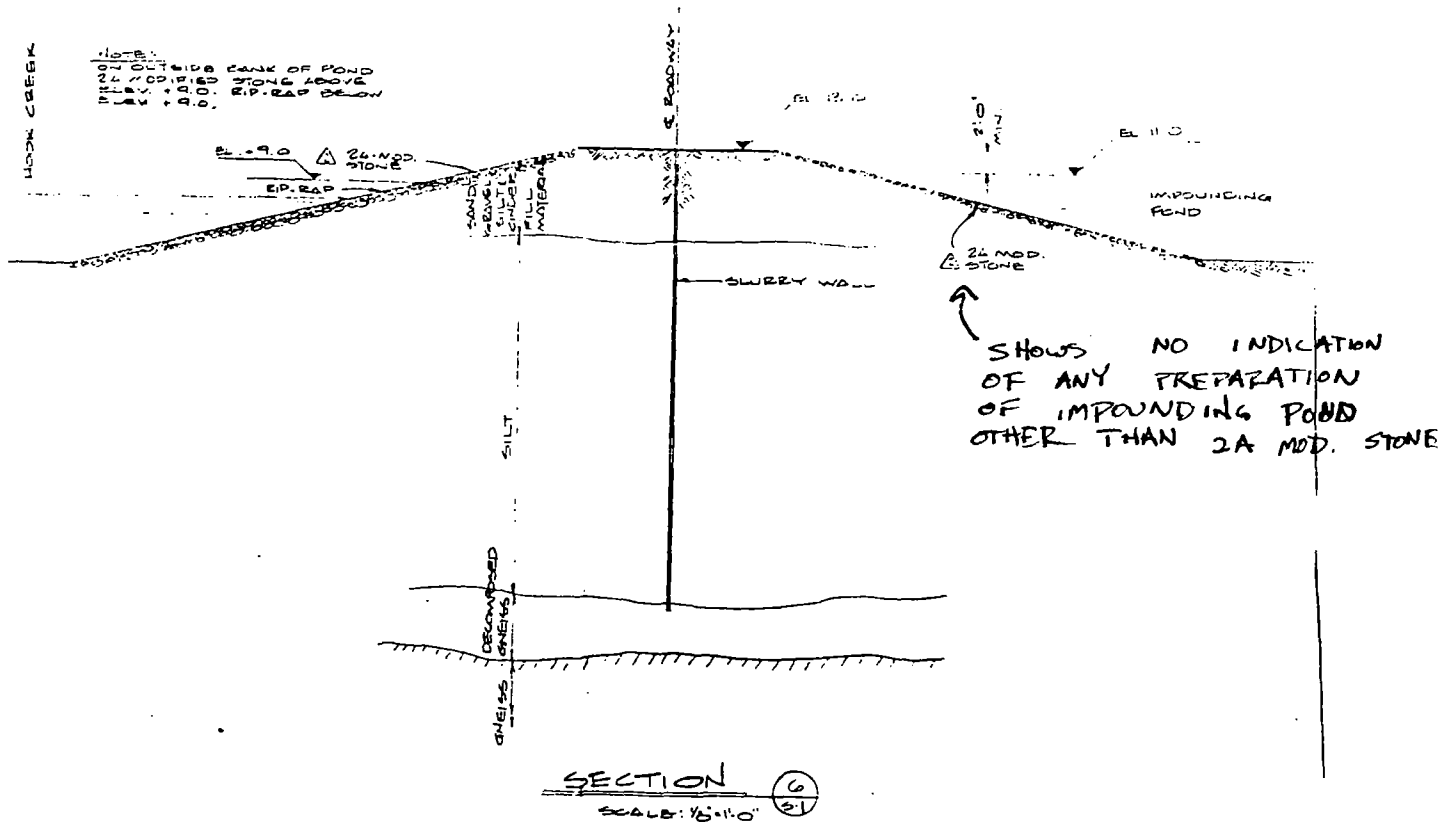
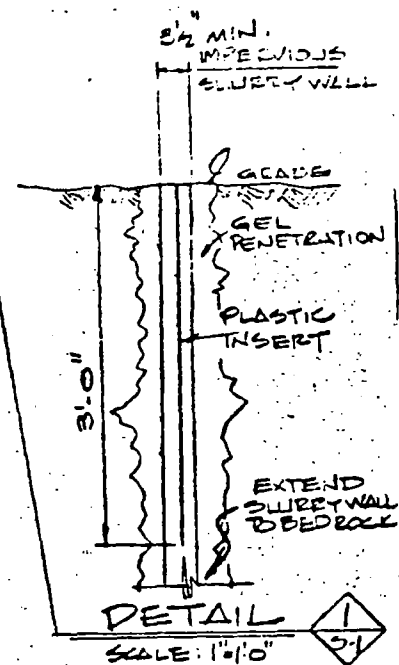
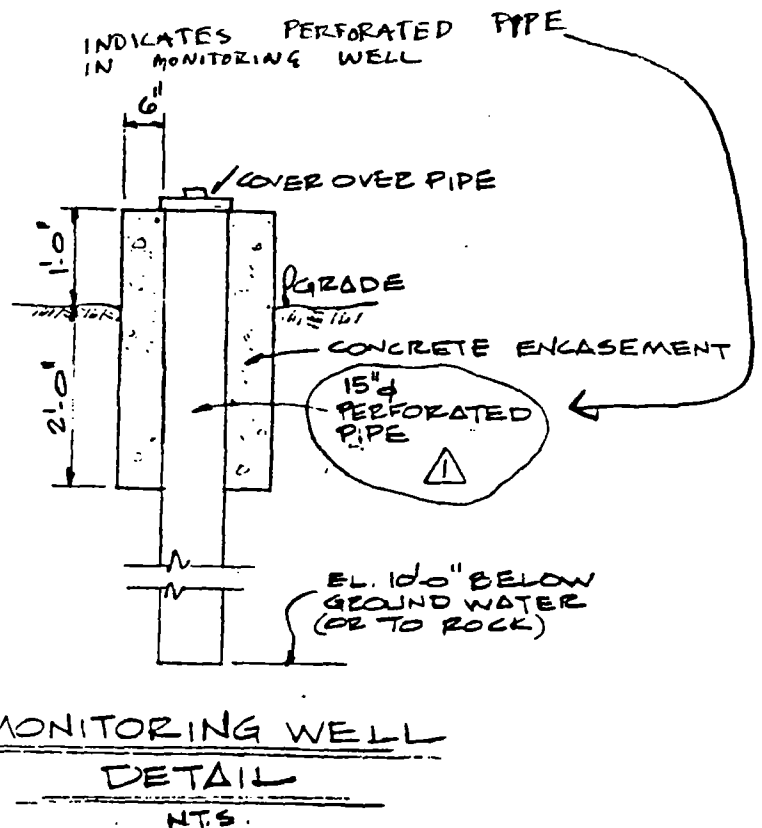


FIGURE 4



SECTION OF SLURRY WALL

FIGURE 5



A-4.1

ORIGINAL

United States
(Red)
Environmental Protection
Agency
Washington DC 20460

EPA Notification of Hazardous Waste Site

810609

PAS-000-001-210

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

There are no records of waste handling at this site. However,

ever, a refinery was operated at the site. It was common industrial practice to dispose of wastes on plant grounds. We may have followed prevailing disposal practice. Such wastes may have been considered hazardous under RCRA Regulation

A Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name ARCO Petroleum Products

Company (H)

Street 515 South Flower Street Company 1

City Los Angeles

State CA

Zip Code 90071

(1) A Division of Atlantic Richfield Company, Los Angeles, Ca

B Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site ARCO PETROLEUM PRODS. MARCUS HOOK REFINER

Street Post Road, P.O. BOX 429

City Marcus Hook

County Delaware State PA

Zip Code 19061

C Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Pope, Arthur E., Mgr., Envir. Policy & Planning

Phone (213) 486-1913

PAD 07 161 2683

D Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1925

To (Year) 1969

E Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☐ Acids.
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical, General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown

11. ☒ Other (Specify)
Unknown wastes from petroleum refining and related activities

18. ☒ Other (Specify)

Petroleum refining and related activities.

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

B-1.0

Notification of Hazardous Waste Site

Side Two

ORIGINAL

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☒ Other (Specify) Unknown

Total Facility Waste Amount

cubic feet Unknown

gallons

Total Facility Area

square feet Unknown

acres

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☐ None☒ Unknown

Note: Items Hand I are optional. Completing these items will assist EPA and State and local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

N

I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other".

Name Arthur F. Pope, Mgr., Envir. Policy & PlanningStreet 515 South Flower StreetCity Los Angeles State CA Zip Code 90071Signature Arthur F. Pope Date 6/8/81

B-1.1

- ☐ Owner, Present
- ☐ Owner, Past
- ☐ Transporter
- ☐ Operator, Present
- ☒ Operator, Past
- ☐ Other

B-1.2

ENVIRONMENTAL PROTECTION AGENCY
NOTIS DATA MANAGEMENT SYSTEM
COMMENT MAINTENANCE FORM

CARD
CODE NTS IDENTIFICATION NO. ^{trans}
F 1 2 13 14 15 16 C 20. Unknown wastes from petroleum refining COMMENT 300
1 2 13 14 15 16 55 56 58 80

CARD
CODE NTS IDENTIFICATION NO. Refining & related activities. COMMENT 301
F 1 2 13 14 15 16 C 55 56 58

CARD
CODE NTS IDENTIFICATION NO. Petroleum Refining & related activities COMMENT 400
F 1 2 13 14 15 16 C 55 56 58

CARD
CODE NTS IDENTIFICATION NO. activities. COMMENT 401
F 1 2 13 14 15 16 C 55 56 58

CARD
CODE NTS IDENTIFICATION NO. Refinery operated at site, wastes COMMENT 001
F 1 2 13 14 15 16 C 55 56 58

ORIGINAL
(Red)

B-13

ENVIRONMENTAL PROTECTION AGENCY
NOTIS DATA MANAGEMENT SYSTEM
COMMENT MAINTENANCE FORM

CARD
CODE NTS IDENTIFICATION NO. *trans Code Card 20* *possibly hazardous under RCRA.* COMMENT *002*
F 1 2 13 14 15 16 55 56 58 80 S

CARD
CODE NTS IDENTIFICATION NO. *UNKNOWN.* COMMENT *600*
F 1 2 13 14 15 16 55 56 58 S

CARD
CODE NTS IDENTIFICATION NO. COMMENT
F 1 2 13 14 15 16 55 56 58 S

CARD
CODE NTS IDENTIFICATION NO. COMMENT
F 1 2 13 14 15 16 55 56 58 S

CARD
CODE NTS IDENTIFICATION NO. COMMENT
F 1 2 13 14 15 16 55 56 58 S

ORIGINAL
(Red)

ARCO Petroleum Products Company
515 South Flower Street
Mailing Address: Box 2679 - T.A.
Los Angeles, California 90051
Telephone 213 486 1913

A. F. Pope
Manager
Environmental Policy and Planning

ORIGINAL
(Red)



CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RCRA SECTION
EPA REGION I

JUN 8 1981 0000252

June 8, 1981

U.S. EPA Region 3
Sites Notification
Philadelphia, Pennsylvania 19106

Gentlemen:

ARCO Petroleum Products Company, a division of Atlantic Richfield Company, hereby submits its Comprehensive Environmental Response, Compensation, and Liability Act - Section 103(c) notification to EPA for locations where hazardous wastes may have been treated, stored, or disposed of, including petroleum refinery facilities presently operated by ARCO Petroleum Products and those petroleum refinery facilities which Atlantic Richfield Company or its predecessor companies owned or operated at the time of waste treatment, storage, or disposal.

This is a good faith effort to report the required information with a reasonable degree of accuracy commensurate with the timeframe available following the publication of EPA's implementing requirements in the Federal Register, Vol. 46, No. 72, Wednesday, April 15, 1981. The locations reported were identified by a review of Atlantic Richfield archives and related historical data, using Company and contractual resources. The information provided is based, for presently operated facilities, on personal knowledge or recollection of present employees or reasonably available records. For facilities owned or operated by predecessor companies, the information is based on the presumption that, since it was common industry practice to dispose of wastes on plant grounds, the prevailing disposal practice may have been followed. Such wastes may have been considered hazardous under RCRA regulations. In some instances, personal knowledge or recollection of present employees supported this premise. No records of waste disposal practices were found to be available for previously owned or operated facilities.

A summary explanation is attached describing the approach taken in developing the information reported on EPA Form 8900-1 for facilities presently operated and for facilities previously owned or operated by Atlantic Richfield Company or its predecessor companies at the time of waste treatment, storage, or disposal.

Please contact Mr. A. F. Pope, Manager, Environmental Policy and Planning, ARCO Petroleum Products Company, 213/486-1913 regarding the information submitted on the enclosed forms.

Very truly yours,


A. F. Pope

AFP/mac

Attachments

B-1.4

**ARCO PETROLEUM PRODUCTS COMPANY
A DIVISION OF
ATLANTIC RICHFIELD COMPANY**

**Facilities Previously Owned or Operated by Atlantic Richfield
Company or Its Predecessor Companies or Operated by
ARCO Petroleum Products Company**

**DISCUSSION OF INFORMATION SUBMITTED
ON EPA FORM 8900-1, "NOTIFICATION OF
HAZARDOUS WASTE SITE"**

GENERAL QUALIFICATION

There are no records of waste handling at these sites. In most instances, there is no recollection or knowledge by present employees of waste handling at these sites. However, petroleum refineries were owned or operated by Atlantic Richfield Company or its predecessor companies at these locations. It was common industry practice to dispose of any wastes on plant grounds. We may have followed the prevailing disposal practice. Such wastes may have been considered hazardous under RCRA regulations.

PART A -- PERSON REQUIRED TO NOTIFY

ARCO Petroleum Products Company is a division of Atlantic Richfield Company. Petroleum refineries are operated by this division. Petroleum refineries owned or operated by Atlantic Richfield Company or its predecessor companies are being notified for by ARCO Petroleum Products Company.

PART B -- SITE LOCATION

Former petroleum refinery locations are given by the street address and city at the time of operation where the information has been available. Where specific address information is not available, the city at the time of operation is provided.

PART C -- PERSON TO CONTACT

The single point of contact for all notifications by ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.

PART D -- DATES OF WASTE HANDLING

Former petroleum refineries owned or operated by Atlantic Richfield Company or its predecessor companies are notified for the earliest known date of facility operation through the latest known date of facility operation.

PART E -- WASTE TYPE

Option 1 has been selected for notification. This option provides the needed flexibility to report known hazardous wastes and the probability that some unknown type of wastes were disposed as a consequence of petroleum refining and related activities. Some of the unknown wastes may have been considered hazardous under RCRA regulations.

B-1.5

**ARCO PETROLEUM PRODUCTS COMPANY
A DIVISION OF
ATLANTIC RICHFIELD COMPANY**

**Facilities Presently Operated
By ARCO Petroleum Products Company**

**DISCUSSION OF INFORMATION SUBMITTED
ON EPA FORM 8900-1, "NOTIFICATION OF
HAZARDOUS WASTE SITE"**

GENERAL QUALIFICATION

This is a good faith effort to report the required information with a reasonable degree of accuracy. The information provided is based on personal knowledge or recollection of present employees or reasonably available records.

PART A -- PERSON REQUIRED TO NOTIFY

ARCO Petroleum Products Company is a division of Atlantic Richfield Company. Petroleum refineries are operated by this division.

PART B -- SITE LOCATION

Existing petroleum refinery locations are given by current street address and city. All aspects of facility waste management which require notification are provided on this basis.

PART C -- PERSON TO CONTACT

The single point of contact for all notifications by ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.

PART D -- DATES OF WASTE HANDLING

ARCO Petroleum Products Company facilities are notified for the earliest known date of facility operation as a refinery through the present.

PART E -- WASTE TYPE

Option 1 has been selected for notification. This option provides the needed flexibility to report known hazardous wastes and the probability that some unknown type of wastes were disposed as a consequence of petroleum refining and related activities. Some of the unknown wastes may have been considered hazardous under RCRA regulations.

PART F -- WASTE QUANTITY

Facility type, waste amount, and area have been determined to the accuracy possible based on personal knowledge or recollection of present employees or reasonably available records. A complete description of facility types, waste amounts, and extent of areas of disposal is not possible, due to the age of the facilities.

PART G -- KNOWN, SUSPECTED OR LIKELY RELEASES TO THE ENVIRONMENT

An additional response "unknown" has been used instead of the available responses. ARCO Petroleum Products Company does not have sufficient information to make the determinations as set forth on the form. While no releases are known, suspected, or likely, we have no specific evidence that none have occurred. The only response appropriate with our knowledge is "unknown".

PART H -- SKETCH MAP OF SITE LOCATION (OPTIONAL)

The presently operated petroleum refinery locations at which waste refinement, storage, or disposal occurred in the past which may be subject to CERCLA Section 103(c) notification are identified in Part B -- Site Location. No map is required to locate these refineries.

PART I -- DESCRIPTION OF SITE (OPTIONAL)

The presently operated petroleum refinery locations at which waste treatment, storage, or disposal occurred in the past which may be subject to CERCLA Section 103(c) notification are described in detail in RCRA Part A applications for each facility. No additional description is required.

PART J -- SIGNATURE AND TITLE

The single point of contact authorized to sign the form for ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

A Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name BP OIL INC.
Street P.O. BOX 428
City MARCUS HOOK State PA Zip Code 19061

B Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site BP OIL INC, MARCUS HOOK REFINERY
Street POST ROAD
City MARCUS HOOK County DELAWARE State PA Zip Code 19061

C Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) MARTINI, S.C., ENGINEERING SPECIALIST
Phone (215) 494-3600, EXTENSION 351

D Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1949 To (Year) PRESENT

E Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:

Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

- ☐ Organics
- ☐ Inorganics
- ☐ Solvents
- ☐ Pesticides
- ☐ Heavy metals
- ☐ Acids
- ☐ Bases
- ☐ PCBs
- ☐ Mixed Municipal Waste
- ☐ Unknown
- ☐ Other (Specify)

Source of Waste:

Place an X in the appropriate boxes

- ☐ Mining
- ☐ Construction
- ☐ Textiles
- ☐ Fertilizer
- ☐ Paper/Printing
- ☐ Leather Tanning
- ☐ Iron/Steel Foundry
- ☐ Chemical, General
- ☐ Plating/Polishing
- ☐ Military/Ammunition
- ☐ Electrical Conductors
- ☐ Transformers
- ☐ Utility Companies
- ☐ Sanitary/Refuse
- ☐ Photofinish
- ☐ Lab/Hospital
- ☐ Unknown
- ☐ Other (Specify)

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 3001 regulations (40 CFR Part 261).

Specific Type of Waste:

EPA has assigned a four-digit number to each hazardous waste listed in the regulations under Section 3001 of RCRA. Enter the appropriate four-digit number in the boxes provided. A copy of the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site is located.

K051		
K052		

Notification of Hazardous Waste Site

Side Two

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☒ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount,

cubic feet

gallons BEST ESTIMATE- 66,000**Total Facility Area**square feet BEST ESTIMATE- 8,100

acres _____

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☐ Suspected ☐ Likely ☒ None

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assessing hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

See attached map

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

*Exhibit A-1 of Preliminary Assessment***I Description of Site: (Optional)**

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

All hazardous waste in the Refinery's sludge lagoon (impoundment 60,000 Ft.²) was removed in 1975. All waste (5,000,000 gallons of API Separator sludge) was chem-fixed and sent to Kinsley Landfill in Deptford, NJ. An additional 66,000 gallons of hazardous waste are located in several small pits (8100 Ft.² total). These pits contain leaded tank bottoms.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other".

Name E.S. KULINSKI *E.S. Kulinski*

Street _____

City _____

State _____

Zip Code _____

Signature _____

Date 6/9/81

- ☐ Owner, Present
- ☐ Owner, Past
- ☐ Transporter
- ☒ Operator, Present
- ☐ Operator, Past
- ☐ Other

B-2.1

WASTE PREPARED

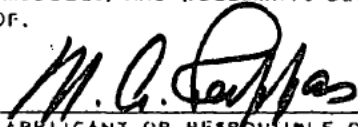
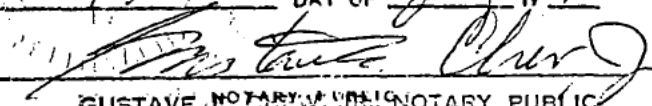
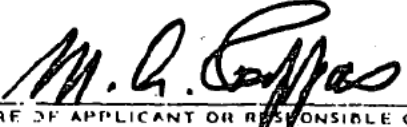
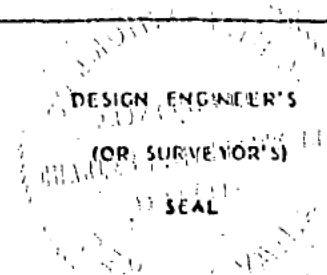
6/30/76

ORIGINAL

(Red)

For Department Use Only

APPLICATION FOR
WATER QUALITY MANAGEMENT PERMIT

APPLICANT NAME B.P. Oil Inc.		PROJECT LOCATION (A) MUNICIPALITY Trainer	
TELEPHONE NO. 215/494-3600		(B) COUNTY Delaware	
MAILING ADDRESS P.O. Box 428 Marcus Hook, Pa. 19061			
HEREBY APPLIES FOR: (CHECK APPROPRIATE BLOCKS IN SECTION A, B, C AND D)			
A. APPROVAL OF PLANS FOR CONSTRUCTION OF: <input type="checkbox"/> PUMP STATIONS, SEWERS AND APPURTENANCES <input type="checkbox"/> SEWAGE TREATMENT PLANT <input type="checkbox"/> MINE DRAINAGE TREATMENT PLANT <input checked="" type="checkbox"/> INDUSTRIAL WASTE TREATMENT PLANT <input type="checkbox"/> OUTFALL AND HEADWALL <input type="checkbox"/> STREAM CROSSING		B. APPROVAL TO DISCHARGE: (1) <input checked="" type="checkbox"/> TREATED <input type="checkbox"/> UNTREATED (2) <input checked="" type="checkbox"/> INDUSTRIAL WASTES <input type="checkbox"/> MINE DRAINAGE <input type="checkbox"/> SEWAGE	
		C. APPROVAL TO OPERATE: <input type="checkbox"/> UNDERGROUND MINE D. APPROVAL OF AN <input type="checkbox"/> EROSION AND SEDIMENTATION PLAN	
(ALL DISCHARGES OF WASTES ARE PURSUANT TO "THE CLEAN STREAMS LAW")			
I HEREBY CERTIFY THAT THE ACCOMPANYING REPORT AND ALL PLANS, MODULES, AND DOCUMENTS DESIGNATED THEREIN ARE ATTACHED TO THIS APPLICATION, AND MADE A PART HEREOF.			
 SIGNATURE OF APPLICANT OR RESPONSIBLE OFFICIAL			
NAME OF APPLICANT OR RESPONSIBLE OFFICIAL: Mr. M. A. Pappas		TITLE Refinery Manager	
ADDRESS BP OIL, Incorporated, PO Box 428, Marcus Hook, Pennsylvania 19061		DATE OF APPLICATION 7/19/76	
AFFIDAVIT COMMONWEALTH OF PENNSYLVANIA, COUNTY OF <u>Delaware</u>			
I, <u>M. A. Pappas</u> BEING DULY SWORN, ACCORDING TO LAW, DEPOSE AND SAY THAT I (AM THE APPLICANT) (AM AN OFFICER OR OFFICIAL OF THE APPLICANT) (HAVE THE AUTHORITY TO MAKE THIS APPLICATION) AND THAT THE PLANS, REPORTS AND DOCUMENTS SUBMITTED AS PART OF THE APPLICATION ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.			
SWORN AND SUBSCRIBED TO BEFORE ME THIS <u>19th</u> DAY OF <u>July</u> 19 <u>76</u>			
 GUSTAVE NOTARY PUBLIC		 SIGNATURE OF APPLICANT OR RESPONSIBLE OFFICIAL	
THIS SECTION BELOW IS TO BE COMPLETED BY THE PERSON AUTHORIZED BY THE APPLICANT TO PREPARE THIS APPLICATION. NOTE: SEWAGE, INDUSTRIAL WASTE, AND MINE DRAINAGE APPLICATIONS REQUIRE A REGISTERED PROFESSIONAL ENGINEER, EXCEPT THAT A REGISTERED SURVEYOR IS ACCEPTABLE WHERE PUBLIC HEALTH AND SAFETY ARE NOT INVOLVED.			
NAME OF DESIGN ENGINEER (OR SURVEYOR) AND FIRM Charles Y. Hitchcock, Jr. Metcalf & Eddy, Inc.			
MAILING ADDRESS 50 Staniford St., Boston, Mass. 02114			
TELEPHONE NUMBER 617/ 523-1900			
AGREEMENT DATE		SIGNATURE OF DESIGN ENGINEER (OR SURVEYOR) <div style="background-color: black; color: red; padding: 5px; text-align: center;">Not responsive due to revised scope</div>	

C-1.0

DATE PREPARED

6-30-76

DATE REVISED

WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

For Department Use ONLY ORIGINAL

APPLICANT B.P. Oil Inc., P.O. Box 428, Marcus Hook, Pa. 19061LOCATION OF PROJECT: MUNICIPALITY Trainer COUNTY DelawareDESIGN ENGINEER AND FIRM Non Responsive based on Revised Scope Metcalf & Eddy, Inc.DESIGN ENGINEER'S ADDRESS 50 Staniford Street
Boston, Mass. ZIP 02114 TELEPHONE 617/523-1900DESCRIPTION OF PROJECT Construction of an impounding pond to contain rainfall
surface runoff and overflows from the wastewater treatment facilities
with subsequent return pumping for treatment on a controlled basis.PROPOSED PROJECT ☐ IS EXISTING ☒ WILL BE COMPLETED ON (DATE) 12/1/76

A. DOCUMENTATION REQUIRED

1. HAS A CHECK FOR \$25.00, PAYABLE TO THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES, BEEN INCLUDED? (NOT REQUIRED OF STATE OR FEDERAL AGENCIES)

☒ Yes ☐ No ☐ N/A

2. HAVE 2 COPIES OF THE APPLICATION, ER-BWQ-51, BEEN SUBMITTED? (THREE (3) COPIES REQUIRED FOR PROJECTS IN THE DELAWARE RIVER BASIN)

☒ Yes ☐ No

3. HAS THE AFFIDAVIT BEEN PROPERLY COMPLETED AND EXECUTED?

☒ Yes ☐ No

B. HAS PROOF OF PUBLICATION BEEN SUBMITTED?

☐ Yes ☒ No See Note 1

3. HAS A POLLUTION INCIDENT PREVENTION REPORT BEEN INCLUDED?

☐ Yes ☒ No See Note 2

4. DOES THE APPLICATION INCLUDE THE FOLLOWING APPLICABLE MODULES:

MODULE NUMBER	TITLE	NUMBER OF PAGES	
2	GENERAL INFORMATION - INDUSTRIAL WASTES	9	<input checked="" type="checkbox"/> Yes
4	WASTE LOAD AND CHARACTERISTICS	3	<input checked="" type="checkbox"/> Yes
5	GEOLOGY AND GROUND WATER INFORMATION	2	<input checked="" type="checkbox"/> Yes
8	PUMPING FACILITIES	1	<input checked="" type="checkbox"/> Yes
9	FLOW EQUALIZATION AND STORAGE BASINS	1	<input checked="" type="checkbox"/> Yes
10	GRIT CHAMBERS	1	<input type="checkbox"/> Yes
11	SCREENING AND COMMINUTING DEVICES	2	<input type="checkbox"/> Yes
12	IMHOFF AND SEPTIC TANKS	2	<input type="checkbox"/> Yes
13	SETTLING TANKS, CLARIFIERS AND THICKENERS	2	<input type="checkbox"/> Yes
14	EARTHEN SETTLING BASINS	2	<input type="checkbox"/> Yes

ORIGINAL
(Red)

Note 1

Public Notice was not given as the impoundment
will not discharge - Regulation 800, Section 2.

Note 2

A Pollution Incident Prevention Report for the
Refinery has been prepared and updated.

C-1.2

DATE PREPARED
6-30-76
DATE REVISED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT
WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

DEM ORIGINAL
For Designing Use Only

B. REQUIRED DATA

1. THE FRONT COVER OR FLYLEAF OF EACH SET OF DRAWINGS AND SPECIFICATIONS MUST BEAR THE SIGNATURE AND SEAL OF THE REGISTERED PROFESSIONAL ENGINEER OR SURVEYOR BY OR UNDER WHOM PREPARED. EACH DRAWING MUST BEAR AN IMPRINT OR REASONABLE FACSIMILE OF SUCH SEAL.

2. SUPPORTING INFORMATION:

A. 2 COPIES OF DESIGNER'S PLANS, MODULES, AND SPECIFICATIONS
(3 COPIES REQUIRED FOR PROJECTS IN DELAWARE RIVER BASIN)

☒ Yes

B. SCHEMATIC FLOW DIAGRAM OF WASTE TREATMENT PLANT SHOWING ALL UNITS DESCRIBED IN MODULES' (ON APPROX 8 1/2 x 11" PAPER, ACCOMPANYING MODULES)

☒ Yes

C. UNITED STATES GEOLOGICAL SURVEY TOPOGRAPHIC MAP SHOWING EXACT POINT OF DISCHARGE AND TREATMENT PLANT LOCATION

☒ Yes

D. HAVE YOU APPLIED FOR APPROVAL OF STREAM ENCROACHMENTS?

☐ Yes ☒ No ☐ N/A

E. HAVE YOU APPLIED FOR APPROVAL OF AIR POLLUTION CONTROL FACILITIES?

☐ Yes ☐ No ☒ N/A

F. HAVE YOU SUBMITTED A LIST OF NAMES, TITLES, AND ADDRESSES OF ALL PARTNERS IN THE CASE OF A PARTNERSHIP OR ALL OFFICERS IN THE CASE OF A CORPORATION, UNINCORPORATED ASSOCIATION, INCORPORATED ASSOCIATION, PARTNERSHIP, OR OTHER ENTITY?

☒ Yes ☐ No ☐ N/A

3. SPECIFY THE FOLLOWING:

PLANS: Preliminary Site Development Con- NO. OF SHEETS 12 DATE July 1976
Title/Description tract I

PLANS: Soil Erosion and Sedimentation NO. OF SHEETS 1 DATE July 1976
Title/Description

PLANS: _____ NO. OF SHEETS _____ DATE _____
Title/Description

PLANS: _____ NO. OF SHEETS _____ DATE _____
Title/Description

B. SPECIFICATIONS (IF APPLICABLE): Preliminary Site Development Contract I,
Section 2AG, Impounding Pond Title

NUMBER OF VOLUMES 1 DATE July 1976

C. OTHER (SPECIFY TYPE AND NUMBER):

Alternate B - Impounding Pond - Clay Liner - 1 sheet
Alternate C - Impounding Pond - Manufactured Liner - 1 sheet
Boring Logs and Observed Water Level Depths - 22 sheets

C-1.3

037000
ORIGINAL
(Red)

DETAILED DESCRIPTION OF PROJECT - IMPOUNDING POND

This permit application is for the construction of an impounding pond at the B.P. Oil, Inc. Refinery at Marcus Hook, Pennsylvania. The function of the pond is to contain contaminated rain runoff for storage. This runoff will be collected from various drainage ditches in the refinery and then conveyed to the pond influent structure by either gravity or pumps. The system is designed for a 10 year storm; 2 inches rainfall per hour for one hour. The pond will also serve as a storage basin for overflows from the API Separator (Surge Basin) which may occur during heavy rainstorms. The impounded water will then be pumped to the wastewater plant on a controlled basis for subsequent treatment.

The pond will have either an earthen clay liner, bentonite liner or PVC type liner, whichever is most economical. Any of these liners will provide an impervious barrier to leakage and groundwater infiltration. In order to ensure the integrity of the liner, an underdrainage system will be installed to prevent hydraulic uplift from the groundwater level. The underdrainage water will be pumped either into the pond or into Marcus Hook Creek depending upon the nature of the groundwater.

Any emergency overflows from the pond will go to Marcus Hook Creek. The overflow pipe is designed such that any floating oil in the pond will not be discharged to the creek.

SOIL EROSION CONTROL

23700 ORIGINAL
(Red)

All earth-moving activities shall be conducted in such a way as to prevent accelerated erosion and the resulting sedimentation. To accomplish this, the Contractors engaged in earth-moving activities shall implement and maintain erosion and sedimentation control measures as described on the attached Metcalf & Eddy, Inc., drawing C-7; or at the Contractor's option he may design, implement and maintain erosion and sedimentation control measures in accordance with Section 102.15 of the Pennsylvania Erosion Control Regulation (Pennsylvania Code, Title 25, Chapter 102 - Erosion Control: Adopted September 21, 1972).

C-1.5

THE STANDARD OIL COMPANY (OHIO)

OFFICERS

C. E. Spahr	Chairman of the Board
A. W. Whitehouse	President
J. D. Harnett	Executive Vice-President
D. G. Stevens	Senior Vice-President
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WATER QUALITY MANAGEMENT
WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

DEM
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ORIGINAL

B. REQUIRED DATA - CONTINUED

4. ARE THE PLANS:

A. CLEAR, LEGIBLE, AND DRAWN TO SCALE?

☒

Yes

☐

No

B. WITHIN MAXIMUM SIZE OF 36 INCHES BY 50 INCHES?

☒

Yes

☐

No

C. CLASS OF CONSTRUCTION

1. TYPE:

☒

NEW

☐

REPLACEMENT OF EXISTING FACILITY

☐

ADDITION AND/OR MODIFICATION TO EXISTING FACILITY

☐

NO NEW CONSTRUCTION-APPROVAL REQUESTED OF EXISTING FACILITY

D. PLANT STATUS

1. IS THE INDUSTRIAL ESTABLISHMENT:

☐

PROPOSED?

☒

EXISTING?

NAME, IF ANY, OF THIS PLANT
Marcus Hook Refinery
B.P. Oil Inc.

2. TYPE OF INDUSTRIAL ESTABLISHMENT (USE STANDARD CODE OF UNITED STATES OFFICE OF STATISTICAL STANDARDS):

CODE 2911

DESCRIPTION Petroleum Refinery

A. TYPE OF PRODUCT: Petroleum Products

B. DAILY PRODUCTION: 150,000 barrels per day

C. DAYS PER YEAR OF PRODUCTION: 365

D. WORKING DAY: 24 hrs AM TO PM

7

DAYS PER WEEK

E. NUMBER OF EMPLOYEES 600

3. TYPE OF OWNERSHIP:

☐

INDIVIDUAL

☒

CORPORATION

☐

PARTNERSHIP

☐

OTHER (SPECIFY)

4. HAS THIS APPLICATION BEEN FILED AS THE RESULT OF A VIOLATION NOTICE, DEPARTMENT ORDER, OR LEGAL STIPULATION?

☐

Yes

☒

No

5. THE DATE OF THE VIOLATION NOTICE, ORDER OR STIPULATION IS

☒

P/A

6. LIST BY NUMBER AND DATE ANY PREVIOUSLY ISSUED PERMITS RELEVANT TO THIS INDUSTRIAL ESTABLISHMENT

2371207 7/30/71

501T1 10/26/70

2372202 5/3/73

1728T1 10/27/70

NPDES -0012637

32T1 10/26/70

C-1.7

WATER POLLUTION CONTROL MODULE 2 - GENERAL INFORMATION INDUSTRIAL WASTES

DEM
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ORIGINAL

(Red)

ORIGINAL

(Red)
No☒ Yes**E. WASTE TREATMENT**

1. ARE INDUSTRIAL WASTES NOW BEING PRODUCED BY THE INDUSTRIAL ESTABLISHMENT?

A. IF YES, ARE THE INDUSTRIAL WASTES:

- 1) ☐ DISCHARGED WITHOUT TREATMENT?
2) ☐ TREATED AND DISCHARGED WITHOUT PERMIT?
3) ☒ TREATED AND DISCHARGED UNDER WATER QUALITY MANAGEMENT PERMIT?
4) ☐ DISCHARGED TO MUNICIPAL SEWERAGE SYSTEM?
☐ SANITARY OR COMBINED SEWERS ☐ STORM SEWERS

NAME OF SYSTEM _____

IF 3) OR 4), ABOVE, WHY IS THE CURRENT APPLICATION BEING MADE? To obtain a permit for construction of an impounding pond.

☐ OTHER (DESCRIBE) _____

- B. WHAT PROCESS OR PROCESSES GENERATE THE WASTE? Petroleum Refining

2. IF THE INDUSTRIAL WASTES ARE BEING TREATED IN AN EXISTING INDUSTRIAL WASTE TREATMENT PLANT, BRIEFLY DESCRIBE THE TREATMENT PROVIDED.

API separator followed by dual media filters followed by carbon adsorbers.

3. WHAT IS THE METHOD OF DISPOSAL OF SANITARY SEWAGE?

- ☒ PUBLIC SEWERAGE SYSTEM
☐ PRIVATE SEWAGE TREATMENT PLANT

Marcus Hook Boro Treatment
Marcus Hook, Pa.
Trainer Boro Treatment

OWNERSHIP Collection System by Chester, Pa.LOCATION Trainer Boro, City of Chester, Marcus Hook, Pa.

- ☐ ON LOT SEPTIC TANK TILE FIELD SYSTEM
☐ OTHER (DESCRIBE) _____

6-30-76

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WATER QUALITY MANAGEMENT
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

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E. WASTE TREATMENT - CONTINUED

4. OPERATIONAL FEATURES

NOTE: IN ANSWERING THE FOLLOWING QUESTIONS, INFORMATION PROVIDED
MUST APPLY TO ALL UNITS OF TREATMENT PLANT.

A. WILL STANDBY EQUIPMENT BE PROVIDED FOR ALL MECHANICAL UNITS
IN THE TREATMENT PLANT?

☒ Yes ☐ No

1.) IF NO, WILL SPARE PARTS BE STOCKED AT THE TREATMENT PLANT
FOR ALL CRITICAL MECHANICAL UNITS?

☐ Yes ☐ No

2.) IF NO, ARE PARTS READILY AVAILABLE FROM LOCAL SUPPLIERS
FOR REPAIRING MECHANICAL BREAKDOWNS?

☐ Yes ☐ No

B. WILL PROCESS PRODUCING WASTES BE DISCONTINUED DURING PERIODS
OF EQUIPMENT FAILURE?

☐ Yes ☒ No

1.) IF NO, DESCRIBE ANTICIPATED REDUCTION IN TREATMENT EFFICIENCY
DURING EQUIPMENT FAILURE.

Equipment is designed with standby units and therefore it is
anticipated that total equipment failure will not occur.

F. RECEIVING STREAM

1. WHAT IS THE NAME OF THE RECEIVING STREAM? Marcus Hook Creek

(IF NO DISCHARGE TO STREAM, CHECK HERE ☐ AND NAME THE STREAM WHICH DRAINS THE AREA)

A. TRIBUTARY OF: Delaware River

B. TRIBUTARY OF: _____

C. MAJOR DRAINAGE BASIN:

☒ DELAWARE

☐ POTOMAC

☐ ALLEGHENY

☐ SUSQUEHANNA

☐ LAKE ERIE

☐ MONONGAHELA

☐ GENESEE

☐ OHIO

2. DESCRIBE THE EXACT POINT(S) OF DISCHARGE:

39 DEG. 49 MIN. 10 SEC. LATITUDE

75 DEG. 24 MIN. 30 SEC. LONGITUDE

A. WATERSHED AREA ABOVE POINT OF DISCHARGE IS

N.A. SQUARE MILES.

3. WHAT IS THE:

A. MINIMUM 7-CONSECUTIVE-DAY FLOW OCCURRING ONCE IN 10 YEAR:

N.A. CUBIC FEET PER SECOND

B. MINIMUM STREAM FLOW: _____ CUBIC FEET PER SECOND Flow measurements
taken in Feb, 1976 for Marcus Hook Creek show average flow of 3 cfs

*ATTACH A U.S. GEOLOGICAL SURVEY 7.5' OR 15' QUADRANGLE MAP SHOWING EXACT POINT(S) OF DISCHARGE.

C-1.9

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WATER QUALITY MANAGEMENT
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

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(Red)

F. RECEIVING STREAM - CONTINUED

C. FLOWS (FROM ITEMS 3.A. AND 3.D.) ARE BASED ON ☒ MEASUREMENTS Feb, 1976 YEARS OF RECORD.
☐ ESTIMATES

D. IF STREAM GOES DRY, FOR HOW MANY DAYS PER YEAR? N.A.

4. IS THE TREATMENT PLANT SUBJECT TO FLOODING?

☐ Yes ☒ No

5. THE PROBABILITY OF THE TREATMENT PLANT BEING OUT OF SERVICE

DUE TO FLOODING IS ONCE IN N.A. YEARS.

A. LIST BRIEFLY THE METHODS USED FOR FLOOD PROTECTION:

6. TO THE BEST OF YOUR KNOWLEDGE, WILL THE TREATED WASTE DISCHARGE ADVERSELY AFFECT:

A. DOMESTIC WATER SUPPLY?

☐ Yes ☒ No

B. BATHING?

☐ Yes ☒ No

C. STOCK WATERING?

☐ Yes ☒ No

D. FISH AND AQUATIC LIFE?

☐ Yes ☒ No

E. INDUSTRIAL WATER SUPPLY?

☐ Yes ☒ No

F. IRRIGATION?

☐ Yes ☒ No

G. BOATING AND AESTHETICS?

☐ Yes ☒ No

H. POWER AND NAVIGATION?

☐ Yes ☒ No

7. IF ANY ITEMS IN 6 ABOVE ARE ANSWERED YES, INDICATE LOCATION AND EXTENT OF ADVERSE EFFECT.

N.A.

C-1.10

2-7

DATE PREPARED
-6-30-76
DATE REVISED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT
WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

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G. PROCESS WATER - CONTINUED

TABLE II

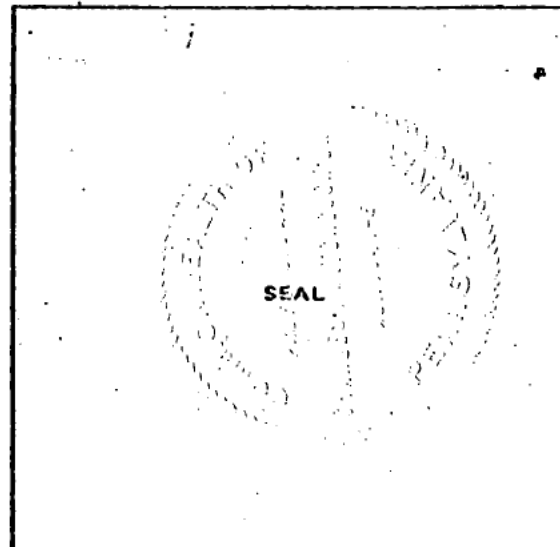
SOURCE	NAME	AVERAGE WATER USE (MGD)
PUBLIC SUPPLY (INDICATE PURVEYOR & WATERSHED)	N.A.	
WELLS	N.A.	
RIVER, STREAM, OR LAKE	Delaware River	120.72
OTHER (SPECIFY)	N.A.	

H. SEAL AND SIGNATURE OF PROFESSIONAL ENGINEER OR SURVEYOR RESPONSIBLE FOR THIS APPLICATION

Not responsive due to revised scope

1. SIGNATURE OF PROFESSIONAL ENGINEER
(Or Surveyor Where Permitted By Law)

2. SEAL OF PROFESSIONAL ENGINEER
(Or Surveyor Where Permitted By Law)



C-1.11

6/30/76

DATE REVISED

WATER POLLUTION CONTROL

ORIGINAL
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MODULE 4 - WASTE LOAD AND CHARACTERISTICS

TABLE I - WASTE STATUS REPORT

TOTAL WASTE FLOW (MGD)		SOURCE OF WASTE: Rainfall Surface Runoff		SOURCE OF WASTE: API Separator Effluent		SOURCE OF WASTE:		SOURCE OF WASTE:		
		<input type="checkbox"/> PRESENT <input checked="" type="checkbox"/> FUTURE		<input checked="" type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE		<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE		<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE		
1. TYPE OF WASTE				Process Waste Water Overflow						
2. FLOW	A. MGD (AVERAGE)	N.A.		0						
	B. MGD (MAXIMUM)	Design Storm 2"/hr./1hrs 23		10.5 During Design Storm						
3. WASTE DISCHARGE	A. TREATED SEPARATELY									
	B. NOT TREATED									
	C. COMBINED AND TREATED		Yes		Yes					
SEQUENCE OF TREATMENT STEPS		UNIT EXISTING	UNIT PROPOSED							
	API Separator	X		X						
	Sand Filter	X		X						
	Activated Carbon	X		X						

A. GENERAL INFORMATION

1. WILL ALL LABORATORY ANALYSES BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER"? ☒ Yes ☐ No ☐ N/A
2. WILL THE TREATMENT PROCESS PRODUCE FOR EACH WASTE ABOVE A SATISFACTORY EFFLUENT THAT WILL HAVE NO ADVERSE EFFECT UPON THE RECEIVING STREAM OR ITS USES? ☒ Yes ☐ No ☐ N/A

ONLY SEWERAGE AND INDUSTRIAL WASTE APPLICANTS COMPLETE ITEM 3.

3. GIVE EXPECTED PERCENTAGE REDUCTION OF:
- A. BOD (5 DAY 20° CENTIGRADE) N.A. % ☐
- B. SUSPENDED SOLIDS N.A. % ☐
- C. SETTLEABLE SOLIDS (SEWAGE ONLY) N.A. % ☐

C-1.12 4-1

AVERAGE

Sample or Data Location - Continued	Rainfall WASTE: Surface Runoff Impounding Pond LOCATION: Influent		Waste Process WASTE: Water Overflow API Separator LOCATION: Effluent		WASTE: _____ LOCATION: _____		WASTE: _____ LOCATION: _____	
INDUSTRIAL WASTE APPLICANTS COMPLETE ALL APPLICABLE ITEMS.	<input type="checkbox"/> PRESENT <input checked="" type="checkbox"/> FUTURE	<input checked="" type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE
SEWAGE APPLICANTS COMPLETE ONLY ITEMS CODED "S."	Waste Load		Waste Load		Waste Load		Waste Load	
MINE DRAINAGE APPLICANTS COMPLETE ONLY ITEMS CODED "M."	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated
	<input type="checkbox"/> Actual <input checked="" type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input checked="" type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.
18. DISSOLVED OXYGEN Mg/L		S	0.5	S		S		S
19. TURBIDITY Units		S-M		S-M		S-M		S-M
20. NITROGEN - AMMONIA Mg/L	S	S	3	S	S	S	S	S
21. NITROGEN - NITRITE Mg/L		S		S		S		S
22. NITROGEN - NITRATE Mg/L		S		S		S		S
23. PHOSPHATE (TOTAL SOLUBLE PO ₄) Mg/L	S	S	0.3	S	S	S	S	S
24. SULFATE Mg/L	M	M		M	M	M	M	M
25. OIL Mg/L	35.8		55					
OTHER (Specify) (Give Units)								
COD Mg/L	35		475					
TOC Mg/L	31.8		160					
Sulfide Mg/L			2					
Phenol Mg/L			1					

3. DESCRIPTION OF SAMPLING PROCEDURE

1. FOR EACH WASTE LOAD ON TABLE II, DESCRIBE BELOW THE METHOD AND DATE(S) OF SAMPLING.

Surface Runoff - Grab samples taken during periods of surface runoff in the winter of 1975 and spring of 1976.

Waste Process Water - 24 hour composite samples 2 weeks in Feb. 1976 and 1 week in April 1976. Grab samples taken three times a week during 1975-1976. Actual waste load characteristics of the Waste Process Water Overflow will be lower than that shown due to the fact that overflows occur due to rain storms which increase plant flow and consequently dilute the waste load.

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WATER POLLUTION CONTROL
MODULE 4 - WASTE LOAD AND CHARACTERISTICS

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C-1.13

TABLE II - WASTE LOAD CHARACTERISTICS

AVERAGE

Sample Or Data Location	Rainfall		Waste Process		WASTE: _____		WASTE: _____	
	WASTE: Surface Run-off Impounding P		WASTE: Water Over-flow (API Separator)		LOCATION: _____		LOCATION: _____	
	LOCATION: Influent		LOCATION: Effluent					
INDUSTRIAL WASTE APPLICANTS COMPLETE ALL APPLICABLE ITEMS.	<input type="checkbox"/> PRESENT <input checked="" type="checkbox"/> FUTURE		<input checked="" type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE		<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE		<input type="checkbox"/> PRESENT <input type="checkbox"/> FUTURE	
SEWAGE APPLICANTS COMPLETE ONLY ITEMS CODED "S."	Waste Load		Waste Load		Waste Load		Waste Load	
MINE DRAINAGE APPLICANTS COMPLETE ONLY ITEMS CODED "M."	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated
	<input type="checkbox"/> Actual <input checked="" type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input checked="" type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.	<input type="checkbox"/> Actual <input type="checkbox"/> Est.
1. WASTE FLOW Mgd	S 23 M Design	S M	S Overflow M 10.5 Max	S M	S M	S M	S M	S M
2. COLOR	S M Storm	S M	S M	S M	S M	S M	S M	S M
3. TEMPERATURE Deg F	S M	S M	S 95°-115° M	S M	S M	S M	S M	S M
4. pH	S M 7	S M	S M 6-7	S M	S M	S M	S M	S M
5. ALKALINITY Mg/L (Minus for Acid)	S M	S M	S M 60	S M	S M	S M	S M	S M
6. SOLIDS - SUSPENDED Mg/L	S M 24.5	S M	S M 77	S M	S M	S M	S M	S M
7. SOLIDS - SUSPENDED CONCENTRATION	S M	S M	S N.A. M	S M	S M	S M	S M	S M
8. SOLIDS - SUSPENDED Lbs/Day	S M	S M	S 1850 M	S M	S M	S M	S M	S M
9. SOLIDS - SETTLEABLE M/L	S M	S M	S 0.1 M	S M	S M	S M	S M	S M
10. SOLIDS - DISSOLVED Mg/L	S M	S M	S 440 M	S M	S M	S M	S M	S M
11. IRON - DISSOLVED Mg/L	S M	S M	S Negligible M	S M	S M	S M	S M	S M
12. IRON TOTAL Mg/L	S M	S M	S M	S M	S M	S M	S M	S M
13. MANGANESE Mg/L	S M	S M	S M	S M	S M	S M	S M	S M
14. ALUMINUM Mg/L	S M	S M	S M	S M	S M	S M	S M	S M
15. BOD Mg/L (5 Day 20° C)	S 21 M	S M	S 100 M	S M	S M	S M	S M	S M
16. BOD Lbs/Cap/Day (5 Day 20° C)	S N.A. M	S M	S N.A. M	S M	S M	S M	S M	S M
17. BOD Lbs/Day (5 Day 20° C)	S M	S M	S 2400 M	S M	S M	S M	S M	S M

DATE PREPARED
6/30/76
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WATER QUALITY MANAGEMENT
WATER POLLUTION CONTROL
MODULE 4 - WASTE LOAD AND CHARACTERISTICSORIGINAL
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C-1.14 4-2

6-21-76
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WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 5 - GEOLOGY AND
GROUND WATER INFORMATION

ORIGINAL

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		IMPOUNDMENT	IMPOUNDMENT	IMPOUNDMENT	
		<input type="checkbox"/> EXISTING <input checked="" type="checkbox"/> PROPOSED	<input type="checkbox"/> EXISTING <input type="checkbox"/> PROPOSED	<input type="checkbox"/> EXISTING <input type="checkbox"/> PROPOSED	
LOCATION	1. A. TOTAL AVAILABLE ACREAGE OF SITE	2.3			
	B. TOTAL ACREAGE UTILIZED	2.3			
	C. DISTANCE (FEET) TO	(1) NEAREST OCCUPIED DWELLING(S)	1,000		
		(2) NEAREST STREAM OR SPRING	40		
		(3) NEAREST WELL(S)	About (b) (9) in upper Chichester.		
	D. IS REQUIRED TOPOGRAPHIC MAP ENCLOSED SHOWING IMPOUNDMENT LOCATION, PROPERTY BOUNDARIES, AND ITEMS A THROUGH C ABOVE?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
WASTE	2. A. INDICATE TYPE OF FACILITY AND PROCESS PRODUCING WASTE.	Impounding Pond for General Runoff plus Overflow of Diluted Processed Waste From Surge Basin in Storm Water Conditions			
	B. EXTENT OF SITE USE	(1) HOURS/DAY	-		
		(2) DAYS/WEEK	Average of 2		
	C. VOLUME (MGD OR CU. FT. / DAY)	See Mod. 4 Waste Load Flow			
BEDROCK	3. A. TYPE OF LITHOLOGY (Sandstone, Shale, Limestone, etc.)	Gneiss			
	B. DEPTH (FT.)	5 to 34			
	C. DIP	Varies 2° to 13°			
	D. FRACTURING, JOINTS OR FAULTS (Describe)	Decomposed in upper 10'-20', weathered below.			
SOILS	4. A. SOIL SERIES (Soil Conservation Service Classification)	Slackwater deposits possibly the Wehadkee Silt Loam			
	B. THICKNESS (Ft. To Bedrock)	5 to 24			
	C. DEPTH TO HIGHEST MOTTLED, FRAGIPAN OR HARDPAN (Ft)	15			
	D. DRAINAGE CHARACTERISTICS (Soil Conservation Service Classification)	poorly drained			

C-1.15

NOTE: IF APPLICATION IS FOR EARTHEN BASIN IMPOUNDMENTS OF OTHER THAN INDUSTRIAL SOLIDS, IRRIGATION, OR DIRECT DISCHARGE TO GROUND WATER, OBTAIN AND SUBMIT MODULE 5A - "SUPPLEMENTARY GEOLOGY AND GROUND WATER INFORMATION"

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(Red)

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DATE PREPARED
DATE REVISED
10/12/76

WATER POLLUTION CONTROL

MODULE 5 – GEOLOGY AND GROUND WATER INFORMATION

5.	GROUND WATER	A. DEPTH TO HIGHEST GROUND WATER TABLE (Ft.)					
		QUALITY	B. (1) CHEMICAL				
			(2) BACTERIOLOGICAL				
		C. DIRECTION OF MOVEMENT					
D. WHAT IS THE PRESENT USE OF GROUND WATER WITHIN A ONE-HALF MILE RADIUS OF IMPOUNDMENT(S)?							
6.	BORINGS	A. ARE LOGS OF BORINGS TO DEPTH OF 25 FEET ENCLOSED GIVING LOCATION AND DESCRIPTION OF ITEMS 3 THROUGH 5 ABOVE? (These are required if information is not otherwise available.)		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		B. IF REQUIRED, IS MONITORING WELL INSTALLED AND LOCATION GIVEN?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7.	PONDS OR LAGOONS	A. HOW WILL SIDES AND BOTTOM BE CONSTRUCTED SO AS TO BE IMPERVIOUS? BRIEFLY DESCRIBE: <u>The slurry cutoff wall vibrating-beam injection method.</u>		The approved slurry mixture will be pumped under controlled pressure through the underlying strata to an impervious material (underlying rock). Each (cont.)			
		B. WITH WHAT WILL SIDES AND BOTTOM BE LINED?		A slurry cutoff wall will be injected (cont.)			
		C. WILL SURROUNDING AREAS BE GRADED TO PREVENT SURFACE WATER FROM ENTERING LAGOON?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		D. ARE THE IMPOUNDMENTS IN AN AREA THAT HAS BEEN DEEP MINED?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
		E. IS THERE ACTIVE SINK HOLE DEVELOPMENT IN THE AREA?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
8.	OTHER OPERATIONS	WILL THE SITE ALSO BE USED FOR SANITARY LANDFILL, IRRIGATION, OR OTHER LAND DISPOSAL OPERATION?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		A. IF YES, HAS THE OPERATION BEEN APPROVED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		B. SPECIFY THE NAME OF PARTY OPERATING THE LAND FILL AND/OR DISPOSAL OPERATION.					
		C. IF PERMITTED, GIVE PERMIT NUMBER.					

7. A. vertical slurry insertion will also overlap the previous insertion. These two factors shall insure a continuous and impervious vertical wall surrounding the impoundment basin. To prevent uncontrolled seepage from the bottom of the impoundment basin, the slurry wall will be terminated at the top of the impervious rock underlying the basin.
- B. into the earthen embankment which will form a continuous impervious vertical wall surrounding the impounding pond. The slurry will consist of a stable colloidal suspension of pulverized natural sodium-cation bentonite, cement and other additives in water. The bentonite will comply with API Standard 13A Sections 3, 5, 6, & 7 with the following exceptions:
- a. Elimination of the yield point plastic viscosity relationship.
 - b. Use of 28 grams of clay instead of 22.5 grams.

The cement will be Portland Cement ASTM C150 Type 1 or 1-S.

The vertical slurry wall will be injected down to the top of the underlying impervious rock which will prevent seepage from the bottom of the pond.

DATE PREPARED

DATE REVISED

10/12/76

MODULE 5A - PHASE I
SUPPLEMENTARY GEOLOGY AND
GROUNDWATER INFORMATION

FOR DEPARTMENT USE ONLY

V. CLIMATOLOGY AND FLOODING

A. Will this be an all-season operation?

☐ YES ☒ NO

1. If seasonal, include operating dates: _____ to _____

B. Precipitation data: For a sanitary landfill requiring collection and treatment of leachate complete 1, 2, 3, 5 & 6.
For spray irrigation complete 3, 4, 5 & 6.
For impoundments complete 2, 5 & 6.

- | | |
|----------------------------------|-----------------------|
| 1. Maximum precipitation | inches/yr. _____ |
| 2. Average precipitation | inches/yr. _____ |
| 3. Maximum monthly precipitation | Month _____ in. _____ |
| 4. Minimum monthly precipitation | Month _____ in. _____ |
| 5. Station of record | _____ |
| 6. Length of historical record | _____ |

C. Flooding Frequency

1. Will all or part of the site be inundated? (check one)

- | | | |
|----------|---------|-----------------|
| a. _____ | once in | 5 years or more |
| b. _____ | once in | 10 years |
| c. _____ | once in | 25 years |
| d. _____ | once in | 50 years |
| e. _____ | once in | 100 years |
| f. _____ | never | |

D. Source of flooding information _____

VI. IMPOUNDMENTS

Answer the following questions for impoundments only:

A. How will the sides and bottom of the impoundment be made impervious?

☒ YES ☐ NO

Briefly describe or explain A vertical slurry cutoff wall will be injected into the earthen embankment surrounding the pond. The slurry will consist of a stable colloidal suspension of pulverized natural sodium-cation bentonite and cement in water. The slurry will be injected down to the impervious bedrock (gneiss) underlying the pond.

B. Will the surrounding area be graded or diked to prevent surface water from entering the impoundment?

☒ YES ☐ NO

Briefly describe or explain The west exterior sides of impoundment will be graded at a 4:1 slope to Hook Creek. A slight berm will be constructed around the other three sides of the pond to prevent surface runoff from entering the pond.

C. Will the sides be constructed to maintain a two (2) foot free-board, and be protected against wave action?

☒ YES ☐ NOD. How will the impoundment be protected from acts of third parties? Pond will be under surveillance of refinery's security force.

C-1.18

6/30/76

DATE REVISED

WATER POLLUTION CONTROL MODULE 9 -- FLOW EQUALIZATION AND STORAGE BASINS

DEM
For Department Use OnlyORIGINAL
(Red)

TABLE 1		UNIT <u>1</u>		UNIT _____		UNIT _____	
INDICATE FUNCTION		<input type="checkbox"/> EXISTING	<input type="checkbox"/> EXISTING	<input type="checkbox"/> EXISTING	<input type="checkbox"/> EXISTING	<input type="checkbox"/> EXISTING	<input type="checkbox"/> EXISTING
COMPLETE ALL APPLICABLE INFORMATION		<input checked="" type="checkbox"/> PROPOSED	<input type="checkbox"/> PROPOSED	<input type="checkbox"/> PROPOSED	<input type="checkbox"/> PROPOSED	<input type="checkbox"/> PROPOSED	<input type="checkbox"/> PROPOSED
		Storage of: <input checked="" type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water	Storage of: <input type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water	Storage of: <input type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water	Storage of: <input type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water	Storage of: <input type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water	Storage of: <input type="checkbox"/> Untreated Waste Water <input type="checkbox"/> Treated Waste Water
WASTE ENTERS THIS UNIT FROM: (Indicate Unit) <u>API Separator & Rainfall Surface Runoff</u>							
1. MATERIALS AND CHARACTERISTICS	a. CONCRETE						
	b. WOOD						
	c. STEEL						
	d. EARTHEN (Excavation, Diked)	<input checked="" type="checkbox"/>					
	EARTHEN BASINS ONLY	(1) INSIDE SLOPE (Vert.: Horiz.)	1: <u>4 & 1:3</u>	1: _____	1: _____		
	(2) OUTSIDE SLOPE (Vert.: Horiz.)	1: <u>4 ; Flat</u>	1: _____	1: _____			
	(3) BERM WIDTH (Ft.)	<u>20</u>					
2. AVERAGE DIMENSIONS	a. LENGTH (Ft.)	<u>315</u>					
	b. WIDTH (Ft.)	<u>225</u>					
	c. OR DIAMETER (Ft.)	<u>N.A.</u>					
	d. DEPTH	(1) NORMAL OPERATING DEPTH (Ft.)	<u>N.A.</u>				
	(2) MAXIMUM AVAILABLE DEPTH (Ft.)	<u>9</u>					
e. FREEBOARD (Ft.)	<u>2.0</u>						
3. DESIGN DATA	a. CAPACITY	(1) NORMAL OPERATING CAPACITY (Gal.)	<u>N.A.</u>				
	(2) TOTAL	COMPUTE THE TOTAL FOR ALL UNITS HERE.					
	(3) MAXIMUM AVAILABLE CAPACITY (Gal.)	<u>4,750,000</u>					
	b. DETENTION	(1) AVERAGE (Hrs.)	<u>N.A.</u>				
	(2) MAXIMUM (Hrs.)	<u>6.5 days</u>					
	c. DISCHARGE TO UNIT	(1) FLOW <u>Gal. per Design Storm</u>	<u>1,398,000</u>				
	(2) DURATION (Hrs./Day)	<u>N.A.</u>					
	d. DISCHARGE FROM UNIT	(1) FLOW (MGD)	<u>0.72; 1.44</u>	<u>Average; maximum</u>			
(2) DURATION (Hrs./Day)	<u>24</u>						

A. GENERAL INFORMATION:

Pumped discharge to API separator. Impounding pond pumps are

1. DESCRIBE OUTLET AND METHOD OF WATER LEVEL CONTROL: manually started and interlocked with the underdrain sump pumps to safeguard the pond lining. Emergency overflow to Marcus Hook Creek.

2. HOW WILL SEDIMENT ACCUMULATION IN THE UNIT BE MINIMIZED? Periodic cleaning

3. WILL SURFACE WATER BE DIVERTED FROM THE BASIN?

☐ Yes ☒ No

4. WILL SIDES BE PROTECTED AGAINST WAVE ACTION?

☒ Yes ☐ No

NOTE: COMPLETE APPROPRIATE PORTIONS OF MODULE 5 IF AN EARTHEN BASIN IS USED.

C-1.20 9-1

IMPOUNDING POND

SECTION 2AG

	<u>Title</u>	<u>Page</u>
2AG.1	General.....	2AG-1
2AG.2	Materials.....	2AG-1
2AG.3	Site Preparation.....	2AG-2
2AG.4	Unclassified Excavation.....	2AG-2
2AG.5	Drainage.....	2AG-3
2AG.6	Placement of Materials.....	2AG-3
2AG.7	Compaction and Moisture Control.....	2AG-4
2AG.8	Settlement of Embankment.....	2AG-5
2AG.9	Alternate Pond Liners.....	2AG-5

2AG.1 General. The Contractor shall provide all materials, labor, tools, and equipment necessary, and shall construct the impounding pond, as indicated on the drawings, as herein specified, or as directed by the Engineer, when required.

As part of the progress schedule, the Contractor shall, prior to starting work and from time to time during its progress, prepare a schedule and outline the methods he plans to use in doing the work.

2AG.2 Materials. All soil material to be used in the construction of embankments, fills, and slopes for the impounding pond shall be as follows:

Modified Bank-Run Gravel: See Bank-Run Gravel (Section 2E), except as follows:

Maximum size:

Drainage Blanket and Cover Layer - 1 in. max. size

All other Zones - 3 in. max. size

Maximum 10 percent passing a number 200 sieve

Admixture: Volcanic ash bentonite (to be added to drainage blankets and cover layers)

Clay Liner & Clay Cutoff Wall: Inorganic, natural soil, free of plant growth, roots, and humus. Maximum 1/2 in. size classified as CL in accordance with ASTM Standard Method for Classification of Soils for Engineering Purposes, Designation D2487-69

Cover Layer: Same as for Drainage Blanket

Samples of modified bank-run gravel and clay fill shall be submitted for approval 21 days prior to use as directed by the Owner. Preferably, one borrow source of modified bank-run gravel fill shall be allowed for the drainage blanket and preferably one source for the cover layer. If more than one borrow source of modified bank-run gravel fill is used, samples of the material from each source shall be submitted for approval 21 days prior to use, as directed by the Owner. After borrow source has been approved, at least two days notice must be given to the Owner before the new borrow is used. The Engineer shall be present during all sampling of borrow materials.

The material to be used for the admixture to the modified bank-run gravel, as indicated on the drawings and where directed by the Engineer, shall be a volcanic ash bentonite clay known as Saline Seal manufactured by the American Colloid Company, Skokie, Ill., or equal.

The admixture proposed for use shall be submitted to the Owner for approval prior to shipment to the job site. A 100 lb. sample shall be submitted at least 21 days prior to use, as directed by the Owner.

2AG.3 Site Preparation. The Contractor shall do all site preparation necessary to properly allow for construction and completion of the impounding pond and related facilities. All work shall be done in accordance with the requirements specified under SITE PREPARATION and as herein specified or as directed by the Engineer.

2AG.4 Unclassified Excavation. The Contractor shall make all excavations necessary for the construction of the impounding pond, as indicated on the drawings, as specified herein, and as directed by the Engineer. The Contractor shall control his operations to prevent any instability or movement of the existing and proposed embankments.

The slopes for the existing sludge pond are marginally stable and instability may occur during excavation. The Contractor shall stage his construction operations, including excavation and backfilling, to prevent weakening or instability of the existing foundation and embankment soils. Slope failures of the pond embankments have previously occurred and excavation of this material shall be as directed by the Engineer.

The unclassified excavation shall consist of, but not be limited to, sludge, organic soils, unstable slope soils, and other excavations necessary for the impounding pond construction.

All excavated materials shall be removed from the construction site and disposed of by the Contractor, at his expense, at appropriate locations within refinery limits as approved by the Owner.

2AG.5 Drainage. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain facilities to intercept and remove promptly and dispose properly of all surface and groundwater and other liquids entering all excavations. Such excavations shall be kept dry during placement of all fill. All work shall be in accordance with subsection titled "Drainage" under EARTH EXCAVATION, BACKFILL, FILL AND GRADING and as herein specified.

A drainage blanket shall be placed as indicated on the drawings. Sump pits shall be set in the drainage as necessary to control the water level in the blanket. Pumps shall be used to maintain the water level a minimum of 12 inches below the surface of the blanket.

2AG.6 Placement of Materials. As specified above, a drainage blanket shall be placed as indicated on the drawings. The drainage blanket shall be placed in one entire lift which is 18 inches in thickness. Where unsuitable or unstable soils are removed below the lower limit of the drainage blanket, these areas shall be backfilled in accordance with procedures and materials for the drainage blanket. For modified bank-run gravel placed in embankments, the layers shall not exceed 8 inches in thickness before compaction. After the drainage blanket is entirely installed throughout the impounding pond area and the water level is lowered as noted above, an 8 inch diameter asphalt-coated corrugated-metal perforated underdrain pipe shall be placed as indicated on the drawings.

Next the bentonite admixture shall be applied at rates as determined by the Engineer. The admixture rate will be approximately between 8 to 15 percent weight. The admixture shall be applied to a loosened 8 inch layer of the drainage blanket. Any reasonable method of spreading will be acceptable if it results in a uniform distribution of the admixture at the specified rates. After the admixture has been uniformly placed and spread, the loosened layer shall be thoroughly mixed by scarifying, disking, and harrowing. Thereafter, the drainage blanket shall be compacted as specified hereinafter.

The Contractor shall provide a sufficient stockpile or nearby source of supply of bentonite so there will be no delay between when the admixture rate is determined by the Engineer and when admixture has to be used in the field.

The clay liner and clay cut-off shall be applied in a uniform 6 inch layer as indicated on the drawings. Compaction shall be as specified hereinafter.

A six-inch cover layer shall be installed over the clay liner as indicated on the drawings. The bentonite admixture shall be applied and construction procedures shall be as previously

specified for the drainage blanket. A minimum of 1 inch of fresh water should be allowed to contact all areas treated with the benonite admixture to effect prehydration. After 4 days of contact with the fresh water, the impounding pond can be put in service.

2AG.7 Compaction and Moisture Control. All materials placed for the drainage blanket, clay liner, and clay cutoff wall and cover layer shall be compacted to 95 percent of maximum density as determined by Method D of ASTM Standard Methods of Test for Moisture-Density Relations of Soils using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8 mm) Drop, Designation D698-70. Modified bank-run gravel placed in embankments and all backfill in pipe trenches and around structures shall be compacted to 95 percent of the maximum density specified above.

Compaction shall be carried out by using equipment that will attain the required compaction without disturbing the existing soils. The existing soils are generally very soft fine-grained soils such as silts and clays which could be disturbed by construction activities.

The Contractor shall submit to the Owner for review and acceptance, the name of a qualified reputable independent soil testing laboratory. All field and laboratory soil tests to determine compliance of fill and backfill materials with specified requirements and to determine compliance with specified compaction requirements will be paid for directly by the Owner. The Contractor shall schedule and make arrangements for all field and laboratory soil tests with the laboratory. The Contractor shall have the laboratory submit to the Owner, as a part of the bid submittal, a fee schedule listing the prices of all soil testing, including but not limited to the following:

- a. Field density tests (sand cone and nuclear density equipment).
- b. Proctor tests.
- c. Hydrometer.
- d. Washed gradation.
- e. Specific gravity.
- f. Atterberg limits.
- g. Water content, etc.

The Owner reserves the right to change the laboratory at any time. The testing laboratory shall submit copies of all soil

test results and soil inspection directly to the Owner and also directly to the Contractor. Preliminary copies of all field tests shall be submitted to the Owner before the testing laboratory representative leaves the site.

The control of moisture during compaction, including those areas to be compacted after adding the mixture, will be based on the results of the compaction test as stated above. All materials shall be compacted at moisture content within two percent of the optimum moisture content as determined from the compaction test. Should the materials at the time of placement or compaction be of such moisture content that the above moisture criteria are not met, then immediate steps shall be taken to dry or wet the material, as the need may be, to bring the moisture content within the specified range.

2AG.8 Settlement of Embankment. The amount of settlement of the foundation of the impounding pond embankment during construction due to the weight of the embankment fill is anticipated to vary widely over the project from being essentially negligible to a possible 18 in. in some areas of the west embankment. Some of the settlement of the embankment is anticipated to occur during construction. The material that must be added to the fill to compensate for settlement of the foundation during construction will be paid for under the appropriate bid item(s).

2AG.9 Alternate Pond Liners. The Contractor shall submit bids for three alternates, defined as A, B and C.

The pond liner for Alternate A is as indicated on sheet C-5 of the drawings.

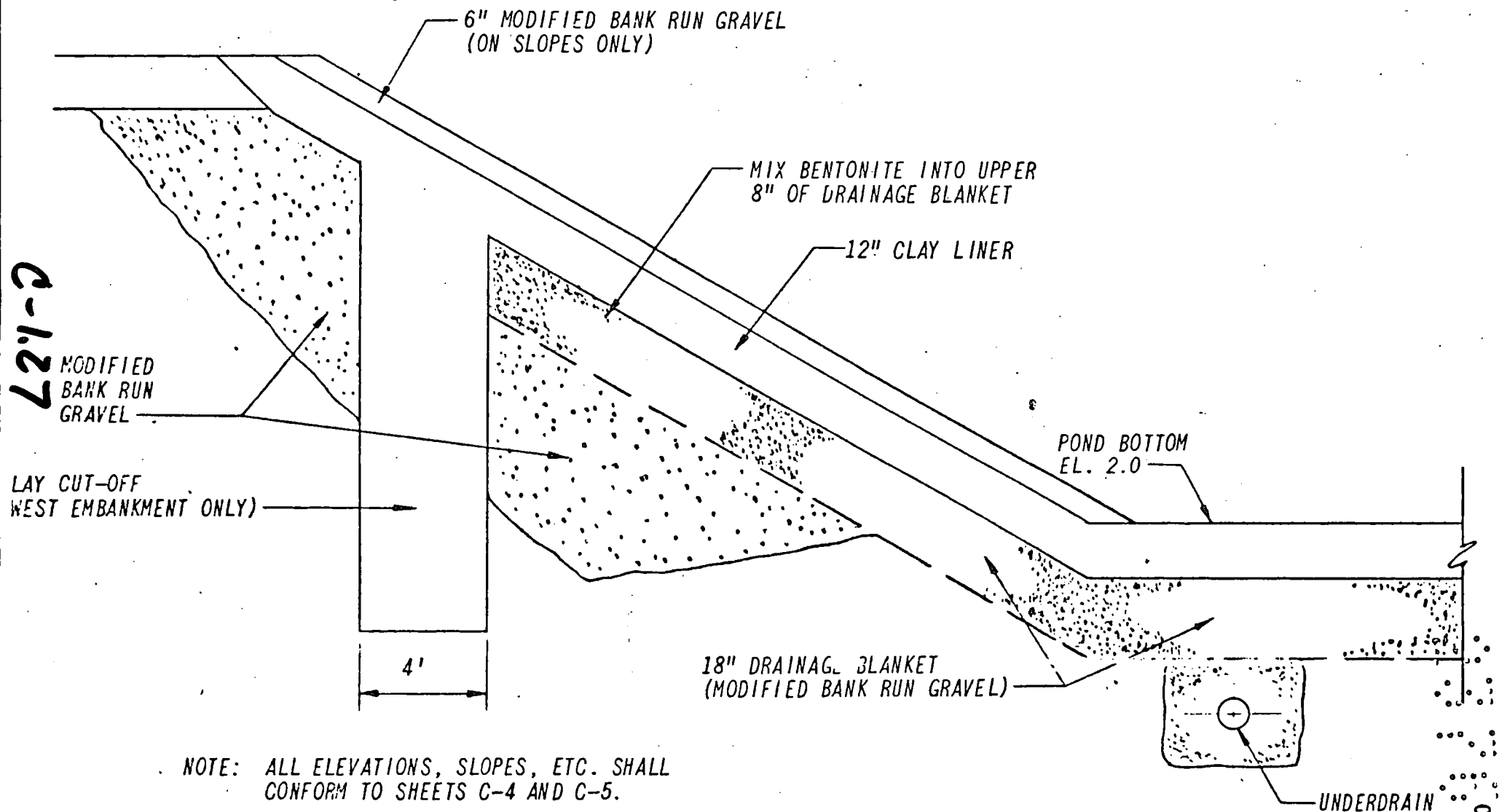
The pond liner for Alternate B is as shown in Appendix A, and consists of a 12-in. clay liner underlain by 18 in. of drainage blanket (modified bank-run gravel). A bentonite admixture shall be applied to the upper 8 in. of the drainage blanket in accordance with placement and compaction requirements of 2AG.6 and 2AG.7. The material to be used for the admixture to the modified bank-run gravel shall be a volcanic ash bentonite clay known as Aquagel manufactured by the National Lead Company or approved equal. The clay liner shall meet the material requirements of 2AG.2 and compaction requirements of 2AG.7.

The pond liner for Alternate C is as shown in Appendix A. The manufactured liner shall be installed in accordance with the manufacturer's recommendations. After the manufactured liner is installed, no construction equipment will be allowed to pass over the liner. The fine concrete aggregate shall conform to the requirements of fine aggregate specified under CONCRETE MASONRY.

Any liner used shall not deteriorate when subjected to the following chemicals or components which may be present in the stored pond liquid at any given time:

<u>Item</u>	<u>Parts per million (maximum)</u>
Sulfide	300
Phenol	15
NH ₃ -N	10
Oil	55
pH	6.0 to 10.0
Temperature	115 deg. F
Total dissolved solids (NaCl)	1,200

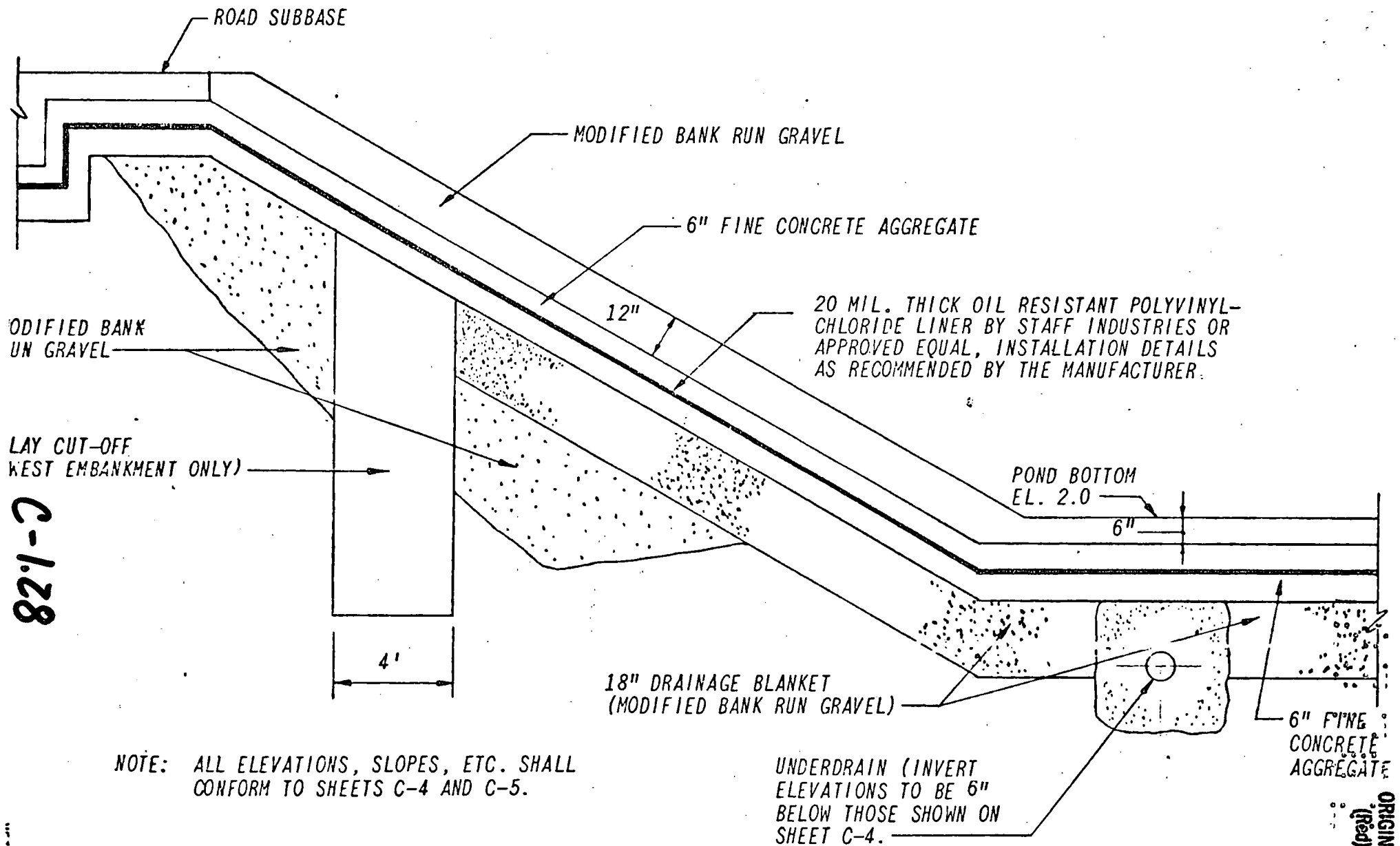
C-1.27



ALTERNATE B - IMPOUNDING POND - CLAY LINER
TYPICAL SECTION

NO SCALE

ORIGINAL
(Red)



ALTERNATE C - IMPOUNDING POND - MANUFACTURED LINER
TYPICAL SECTION

NO SCALE

ORIGINAL
(Red)

EDWARD H. RICHARDSON ASSOCIATES, INC.

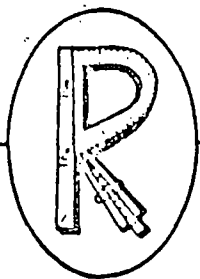
CONSULTING ENGINEERS • LANDSCAPE ARCHITECTS

PLANNERS • ENVIRONMENTAL SCIENTISTS • SURVEYORS

GENERAL OFFICES: RICHARDSON BUILDING • 910 SOUTH CHAPEL STREET • NEWARK • DELAWARE

MAIL ADDRESS: P.O. BOX 675 • NEWARK • DELAWARE 19711

PHONE (302) 738-7551



March 18, 1976

LIST OF TEST BORING B. P. PLANT

<u>Test Bore Number</u>	<u>Coordinates</u>		<u>Elevation</u>
1	N 2034.06	E 1294.84	16.1
2	N 2034.13	E 1490.61	17.6
3	N 2040+	E 1700+	18.0
4	N 2137.17	E 1913.31	12.9
5	N 2135.64	E 1815.15	12.0
6	N 2117.23	E 1599.59	16.2
7	N 2146.41	E 1412.25	16.6
8	N 2187.30	E 1570.04	16.3
9	N 2284.80	E 1695.83	13.0
10	N 2300.23	E 1914.23	10.3
11	N 2365.25	E 1745.42	13.7
12	N 2375.08	E 1517.76	10.4
13	N 1912.07	E 1295.77	7.6
14	N 1917.70	E 1521.40	7.8
15	N 1857.32	E 1279.36	12.8
16	N 1862.99	E 1378.64	11.0
17	N 1861.25	E 1522.59	10.3
18	N 1814.53	E 1352.60	1.9+
19	N 1798.15	E 1535.16	6.20
20	N 1747.75	E 1285.92	12.10
21	N 1754.67	E 1586.34	15.6
22	N 1665.04	E 1294.36	11.6
23	N 1935+	E 1660+	
24	N 1680.68	E 1354.48	1.9+
25	N 1664.17	E 1514.76	1.9+
26	N 1605.31	E 1412.48	14.1
36	N 2330+	E 1615+	
38	N 2500.08	E 2021.18	24.2
39	N 2504.38	E 2077.67	24.1

C-1.29



237600 ORIGINAL (Ret)

OBSERVED WATER DEPTH IN FEET, BELOW EXISTING GROUND SURFACE,
AT VARIOUS DATES

Boring number	2-2-76	2-5-76	2-9-76	2-10-76	2-16-76	2-27-76	5-13-76
B-1	7.5			7.55	7.7	7.0	6.9
B-2				5.8	6.5	6.6	
B-3				9.4	4.0	7.9	6.8
B-4					2.0	1.8	
B-5					G.S.	0.8	
B-6		6.5 C.I.					
B-7	7.8	7.8		6.2	7.5	7.3	
B-8				7.9	7.6	7.2	
B-9			4.0	3.7	4.5	3.7	
B-10					4.5	3.7	0.2*
B-11				2.4	1.8	1.8	
B-12				4.6	2.9	3.0	5.7
B-13		G.S.		G.S.	G.S.	G.S.	
B-14				G.S.	G.S.	G.S.	
B-15		5.8		5.9	6.1	6.0	
B-16				4.0	4.4	4.1	
B-17				G.S.-C.I.		G.S.	
B-18							
B-19				0.5	G.S.		
B-20		3.9		4.5			
B-21					9.0	8.5	
B-22		3.9		4.1	4.3	5.3	
B-24							
B-25							

*

Observation well may be plugged.

C-1.30

ORIGINAL
(Red)

OBSERVED WATER DEPTH IN FEET, BELOW EXISTING GROUND SURFACE,
AT VARIOUS DATES (Continued)

Boring number	2-2-76	2-5-76	2-9-76	2-10-76	2-15-76	2-27-76
B-26		2.5		2.8	4.2	3.1
B-38					6.0	5.7
B-39						

NOTE: G.S. = Ground surface.
C.I. = Cave-in.

C-1.31

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

B. P. Oil Refinery Property

(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

OLE NO. 1 SURFACE ELEVATION RIG NO. DATE: From 1/28 To 1/30 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX. 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
0'0"	Fill, clayey sand to sandy clay	1	0'0"- 1'6"	3- 8-8			1-2	52-53
10'0"		2	5'0"- 6'6"	8- 6-5			2-3	53-54
10'0"	Sand and small gravel	3	10'0"- 10'3"	100 65	(140 lb. hammer)		3-4	54-55
10'0"		4	15'0"- 16'6"	1- 1-1			4-5	55-56
15'0"	Gray river silt	5	20'0"- 21'8"	Press	18"	2" Tube Sample	5-6	56-57
45'0"		6	25'0"- 26'6"	1- 2-2			6-7	57-58
45'0"	Gray sand, some small gravel	7	30'0"- 31'6"	1- 1-1		Some vegetation	7-8	58-59
47'0"		8	35'0"- 36'6"	1- 2-3		Some vegetation	8-9	59-60
47'0"	Weathered gneiss	9	40'0"- 41'6"	1- 1-2		Vegetation	9-10	60-61
51'0"		10	45'0"- 46'6"	3- 8-22			10-11	61-62
			47'0"- 51'0"		7"	Core	11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
DEPTH	TIME	DATE	SIZE	AMOUNT	REASON	DRIVE HAMMER	SPOON HAMMER	CASING SIZE
4'	10 am	1/29/76	PVC	30'	Water obs.	300 LBS.	140 LBS.	4 INCH
4'	8 am	1/30/76						2 INCH
10'	2 pm	1/30/76						1X INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.32

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL

(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: Metcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

OLE NO. 2 SURFACE ELEVATION _____ RI: NO. _____ DATE: _____ From 2/3 To 2/3 19 76

BORING LOG			SPOON SAMPLE AND CORE DATA				BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
0'0" - 15'0"	Fill, sand and silt	1	0'0" - 1'6"	50-40-17		Top. frozen	1-2	52-53
		2	5'0" - 6'6"	1-1-1			2-3	53-54
15'0" - 25'0"	Gray silt	3	10'0" - 11'6"	1-1-2			3-4	54-55
		4	15'0" - 16'6"	2-3-3			4-5	55-56
25'0" - 31'0"	Decomposed gneiss	5	16'6" - 18'0"	1-1-1			5-6	56-57
		6	21'0" - 22'6"	WOH-3		Silt and vegetation	6-7	57-58
		7	25'0" - 26'6"	5-8-14			7-8	58-59
		8	30'0" - 31'0"	22-125		Refusal at 31'.	8-9	59-60
							9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
DEPTH	HOUR	DATE	SIZE	AMOUNT	REASON	DRIVE HAMMER	SPoon HAMMER	CASING SIZE
6'	4:30pm	2/3/76		0000		300 LBS.	140 LBS.	4 INCH
9'	8:00am	2/4/76						2 INCH
								NX INCH

PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
SIZE	AMOUNT	REASON	DRIVE HAMMER	SPoon HAMMER	CASING SIZE
	0000		300 LBS.	140 LBS.	4 INCH
					2 INCH
					NX INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft/seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller: Not responsive due to revised scope

Helper:

Helper:

C-1.33

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL

(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

FILE NO.	3	SURFACE ELEVATION	RIC NO.	DATE:	From	2/4	To	2/5	19 76
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BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D - NO. PCS. REMARKS *	0-1	51-52
0'0"	Sand, silt, cinders, gravel, fill	1	0'0"-1'6"	28-23-20		Damp, dense	1-2	52-53
3'0"		2	5'0"-6'6"	4-2-2		Damp, loose	2-3	53-54
3'0"	Cinders, fill	3A	10'0"-11'0"	1-2		Damp, soft	3-4	54-55
6'0"		3B	11'0"-11'6"	16		Damp, medium	4-5	55-56
8'0"	Brown silt	4	15'0"-16'6"	6-7-9		Damp, medium	5-6	56-57
11'0"		5	20'0"-20'1"	100 No rec.		Damp, very dense	6-7	57-58
11'0"	Brown silty sand with some gravel						7-8	58-59
14'0"							8-9	59-60
14'0"	Brown decomposed gneiss						9-10	60-61
20'1"							10-11	61-62
			Set well point to depth of 15'.				11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

DATE	TIME	DEPTH
2/9/76	3:30pm	7'

PIPE AND CASING LEFT IN HOLE

SIZE	AMOUNT	REASON

DISTANCE HAMMER DROP 24-30 INCH

DRIVE HAMMER 300 LBS.

SPOON HAMMER 140 LBS.

CASING SIZE 4 INCH

SPOON SIZE 2 INCH

SIZE OF CORE BIT 1 INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc. at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C-1.34

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

B. P. Oil Refinery Property
ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

HOLE NO. 13 SURFACE ELEVATION _____ RIG NO. _____ DATE: _____ From 2/3 To 2/4 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA				BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER FT. ON SAMPLES	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS*	0-1	51-52
0'0" - 34'0"	Gray organic silt	1	0'0" - 1'6"	0-1	Soft, moist	1-2	52-53
		2	1'6" - 6'6"	0-1-1	Soft, moist	2-3	53-54
7'0" - 6'6"	Greenish-gray fine sandy silt, trace of small gravel	3	10'0" - 11'6"	0-1-1	Trace of lignite and fine sand	3-4	54-55
		4	15'0" - 16'6"	Wt. of hammer	Soft, moist	4-5	55-56
38'6" - 51'6"	Greenish-gray decomposed gneiss	5	20'0" - 21'6"	Wt. of hammer	Soft, moist	5-6	56-57
		6	25'0" - 26'6"	Wt. of hammer	Soft, moist	6-7	57-58
		7	30'0" - 31'6"	Wt. of hammer	Trace of fine sand	7-8	58-59
		8	35'0" - 36'6"	96-8-5	Damp	8-9	59-60
		9	40'0" - 41'6"	19-24-32	Damp	9-10	60-61
		10	45'0" - 46'6"	14-22-27	Damp	10-11	61-62
		11	50'0" - 51'6"	22-37-68	Damp	11-12	62-63
						12-13	63-64
						13-14	64-65
						14-15	65-66
						15-16	66-67
						16-17	67-68
						17-18	68-69
						18-19	69-70
						19-20	70-71
						20-21	71-72
						21-22	72-73
						22-23	73-74
						23-24	74-75
						24-25	75-76
						25-26	76-77
						26-27	77-78
						27-28	78-79
						28-29	79-80
						29-30	80-81
						30-31	81-82
						31-32	82-83
						32-33	83-84
						33-34	84-85
						34-35	85-86
						35-36	86-87
						36-37	87-88
						37-38	88-89
						38-39	89-90
						39-40	90-91
						40-41	91-92
						41-42	92-93
						42-43	93-94
						43-44	94-95
						44-45	95-96
						45-46	96-97
						46-47	97-98
						47-48	98-99
						48-49	99-100
						49-50	100-101
						50-51	101-102

GROUND WATER

DEPTH	TIME	DATE
0'6"	10 min	2/6/76

PIPE AND CASING LEFT IN HOLE

SIZE	AMOUNT	REASON

DISTANCE HAMMER DROP 24-30 INCH
DRIVE HAMMER 300 LBS.
SPOON HAMMER 140 LBS.
CASING SIZE NX INCH
SPOON SIZE 2 INCH
SIZE OF CORE BIT _____ INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seam or broken Rock, Caving, Cavities, unusual Ground

Driller _____

Helper _____

Not responsive due to revised scope

C-1.35

C-1.36

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

B. P. Oil Refinery Property

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

 HOLE NO. 15 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 2/4 To 2/5 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER 6" ON SAMPLES	ROCK CORE RECOVERED	D=DRY U=UNDISTURBED T=TRAP W=WASH R=RID C=CORE CORE RECOVERED - NO. PCS. REMARKS *	0-1	51-52
0'0" - 6'6"	Brown silt, sand and gravel, trace of cinders, fill	1	0'0" - 2'0"	11-10 8-9			1-2	52-53
		2	2'0" - 4'0"	7-6 8-7			2-3	53-54
		3	4'0" - 6'0"	6-6 7-7			3-4	54-55
		4	6'0" - 7'6"	2- 2-2			4-5	55-56
6'6" - 9'0"	Gray river silt, oily	5	7'6" - 9'0"	21- 20-19			5-6	56-57
		6	9'0" - 10'6"	2- 2-1			6-7	57-58
10'0" - 40'0"	Gray sandy silt	U7	10'6" - 12'6"	Push	21"	3" Shelby Tube	7-8	58-59
		8	12'6" - 14'0"	1- 1-1			8-9	59-60
		9	14'0" - 15'6"	1- 1-1			9-10	60-61
		10	15'6" - 17'0"	1- 1-1			10-11	61-62
		11	17'0" - 18'6"	1- 1-1			11-12	62-63
		12	18'6" - 20'0"	1- 1-2			12-13	63-64
		13	20'0" - 22'0"		24"	3" Shelby Tube	13-14	64-65
		14	22'0" - 23'6"	1- 1-1			14-15	65-66
		15	23'6" - 25'0"	1- 1-2			15-16	66-67
		16	25'0" - 26'6"	1- 1-1			16-17	67-68
		17	26'6" - 28'0"	1- 1-2			17-18	68-69
		18	28'0" - 29'6"	1- 1-1			18-19	69-70
		19	29'6" - 31'0"	1- 1-1			19-20	70-71
		20	31'0" - 32'6"	1- 1-2			20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
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							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
DATE	TIME	DEPTH	SIZE	AMOUNT	REASON	DRIVE HAMMER	SPOON HAMMER	CASING SIZE
2/5/76	3 pm	6'0"				300 LBS.	140 LBS.	4" - 1/2"
2/9/76	8 am	5'6"						2" INCH
								SIZE OF CORE BIT

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C-1.37

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

HOLE NO. 15 SURFACE ELEVATION RIG NO. DATE: From 2/4 To 2/5 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASIN	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER FT. ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
		21	32'6"- 34'0"	2- 2-2			1-2	52-53
		22	34'0"- 35'6"	2- 2-2			2-3	53-54
		23	35'6"- 37'0"	1- 2-2			3-4	54-55
		24	37'0"- 38'6"	2- 2-2			4-5	55-56
		25	38'6"- 40'0"	1- 2-2			5-6	56-57
		26	40'0"- 41'6"	1- 1-2			6-7	57-58
		27	41'6"- 43'0"	5- 18-35			7-8	58-59
		28	43'0"- 44'6"	29- 35-14			8-9	59-60
		29	44'6"- 46'0"	7- 22-24			9-10	60-61
		30	46'0"- 47'6"	18- 20-38			10-11	61-62
		31	47'6"- 49'0"	17- 34-56			11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
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							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
DATE	TIME	DEPTH	SIZE	AMOUNT	REASON	INCH	INCH	INCH

PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
SIZE	AMOUNT	REASON	INCH	INCH	INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc. at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.38

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

B. P. Oil Refinery Property

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.LOCATION: Marcus Hook, Pa.
 HOLE NO. 16 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 2/5 To 2/9 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER FT. ON SAMPLES	ROCK CORE RECOVERED	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOVERED — NO. PCS. REMARKS *	0-1	51-52
0'0"	Brown silt, sand, gravel, clay, fill	1	0'0"- 1'6"	3- 3-4			1-2	52-53
8'0"		2	5'0"- 6'6"	1- 1-1			2-3	53-54
		3	10'0"- 11'6"	1- 2-2			3-4	54-55
		4	15'0"- 16'6"	1- 1-1			4-5	55-56
8'0"	Gray organic river silt	5	20'0"- 21'6"	1- 0-1			5-6	56-57
		6	25'0"- 26'6"	2- 7-11			6-7	57-58
		7	30'0"- 31'6"	10- 21-33			7-8	58-59
		8	35'0"- 36'6"	20- 27-37			8-9	59-60
20'0"	Gray organic river silt with vegetation and sand	9	40'0"- 41'6"	31- 70-96			9-10	60-61
25'6"							10-11	61-62
							11-12	62-63
							12-13	63-64
25'6"	Gray-brown decomposed gneiss						13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

PIPE AND CASING LEFT IN HOLE

DISTANCE HAMMER DROP 30 INCH
 DATE 2/09/76
 TIME 4 pm
 DATE 2/10/76
 TIME 10 am

SIZE	AMOUNT	REASON
	none	

DRIVE HAMMER 300 LBS.SPOON HAMMER 140 LBS.CASING SIZE NX INCHSPOON SIZE 2 INCH

SIZE OF CORE BIT _____ INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C-1.39

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

B. P. Oil Refinery Property



ORIGINAL
 (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

BOLE NO. 17 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 2/9 To 2/10 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX. 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
0'0" - 8'0"	Brown silt, sand, gravel, clay, fill	1	0'0" - 1'6"	6-4-4			1-2	52-53
		2	5'0" - 6'6"	1-2-1			2-3	53-54
							3-4	54-55
							4-5	55-56
							5-6	56-57
							6-7	57-58
							7-8	58-59
							8-9	59-60
8'0" - 10'0"	Gray organic river silt	U3	10'0" - 11'10"	Push	22"	2" Shelby Tube sample.	9-10	60-61
		U4	15'0" - 16'10"		22"	2" Shelby Tube sample.	10-11	61-62
							11-12	62-63
							12-13	63-64
16'10" - 17'6"	Gray sandy silt		No sample -	noticed change in wash water.			13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
17'6" - 20'0"	Decomposed gneiss		No sample -	noticed change in wash water.			17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

PIPE AND CASING LEFT IN HOLE

DISTANCE HAMMER DROP 30 INCHDRIVE HAMMER 300 LBS.SPOON HAMMER 140 LBS.CASING SIZE NX INCHSPOON SIZE 2 INCH

SIZE OF CORE BIT _____ INCH

DEPTH 3' HOUR 4 pm DATE 2/10/76

PIPE SIZE _____ AMOUNT _____ REASON _____

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller Not responsive due to revised scope

Helper _____

Helper C-1.40

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: Matcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

OLE NO. 18

SURFACE ELEVATION

RIG NO.

DATE:

From

2/12

T

2/13

19 76

BORING LOG		SPOON SAMPLE AND CORE DATA						BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX. 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=RCD C=CORE	CORE RECOV'D - NO. PCS. REMARKS *	0-1	51-52
								1-2	52-53
								2-3	53-54
								3-4	54-55
								4-5	55-56
0'0" 20'0"	Gray organic silt	1	0'0"- 1'6"	Wt. of hammer			Some oil sludge	5-6	56-57
		2	2'0"- 3'6"	Wt. of hammer			Soft, moist	6-7	57-58
20'0" 30'0"	Greenish-gray decomposed gneiss	3	5'0"- 6'6"	Wt. of hammer			Soft, moist	7-8	58-59
		4	10'0"- 11'6"	Wt. of hammer			Soft, moist	8-9	59-60
		5	15'0"- 16'6"	Wt. of hammer			Soft, moist	9-10	60-61
		6	20'0"- 21'6"	4- 6-10			Damp	10-11	61-62
		7	25'0"- 26'6"	20- 24-30			Damp	11-12	62-63
		8	30'0"- 31'6"	21- 30-42			Damp	12-13	63-64
		9	35'0"- 36'6"	41- 68-112			Damp	13-14	64-65
								14-15	65-66
								15-16	66-67
								16-17	67-68
								17-18	68-69
								18-19	69-70
								19-20	70-71
								20-21	71-72
								21-22	72-73
								22-23	73-74
								23-24	74-75
								24-25	75-76
								25-26	76-77
								26-27	77-78
								27-28	78-79
								28-29	79-80
								29-30	80-81
								30-31	81-82
								31-32	82-83
								32-33	83-84
								33-34	84-85
								34-35	85-86
								35-36	86-87
								36-37	87-88
								37-38	88-89
								38-39	89-90
								39-40	90-91
								40-41	91-92
								41-42	92-93
								42-43	93-94
								43-44	94-95
								44-45	95-96
								45-46	96-97
								46-47	97-98
								47-48	98-99
								48-49	99-100
								49-50	100-101
								50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP 24-30 INCH		
DEPTH	TIME	DATE	SIZE	AMOUNT	REASON	DRIVE HAMMER	SPoon HAMMER	CASING SIZE
						300 LBS.	140 LBS.	NX INCH
								2 INCH
								SIZE OF CORE BIT

4.15: Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc. at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C-14

SPRAGUE & HENWOOD, Inc.

SCRANTON, PA.

D. P. Oil Refinery Property

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

 NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

 HOLE NO. 19 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 2/9 To 2/10 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER FT. ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D - NO. PCS. REMARKS *	0-1	51-52
0'0" - 4'0"	Gray-brown silt, some small gravel, fill	1	0'0" - 1'6"	6-2		Damp	1-2	52-53
		2	1'6" - 3'6"	2-2		Moist	2-3	53-54
4'0" - 6'6"	Gray organic silt	3	3'6" - 5'0"	1-1		Soft, moist	3-4	54-55
		4	5'0" - 10'0"	5-5		Damp	4-5	55-56
9'6" - 18'3"	Greenish-gray to brown decomposed gneiss	5	10'0" - 15'6"	16-18		Damp	5-6	56-57
		6	15'6" - 18'3"	100/3"		Damp	6-7	57-58
							7-8	58-59
							8-9	59-60
							9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

PIPE AND CASING LEFT IN HOLE

DISTANCE HAMMER DROP 24-30 INCH

DATE	TIME	DATE	SIZE	AMOUNT	REASON
2/11/76	4 pm	2/11/76			

DRIVE HAMMER	300 LBS.
SPOON HAMMER	140 LBS.
CASING SIZE	NX INCH
SPOON SIZE	2 INCH
SIZE OF CORE BIT	INCH

NOTE: Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller Not responsive due to revised scope

Helper

Helper

C-1.42

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL
 (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.
 HOLE NO. 20 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 1/30 To 2/3 19 76

BORING LOG

SPOON SAMPLE AND CORE DATA

BLOWS ON CASING

DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX. 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D - NO. PCS. REMARKS *	0-1	51-52
0'0"	Silt, concrete, sand, gravel, fill	1	0'0"	3-5		Taking continuous samples 0 to 43'6".	1-2	52-53
7'0"		2	2'0"	5-6			2-3	53-54
			2'0"	1-			3-4	54-55
			3'6"	2-2			4-5	55-56
7'0"	Gray river silt	3	3'6"	2-			5-6	56-57
24'0"		4	5'0"	2-2			6-7	57-58
			5'0"				7-8	58-59
			7'0"	Push	10 1/2"	3" Shelby Tube	8-9	59-60
24'0"	Gray river silt with seams of fine to medium sand	5	7'0"	1-			9-10	60-61
25'6"		6	8'6"	1-2			10-11	61-62
			8'6"	2-			11-12	62-63
			10'0"	2-3			12-13	63-64
25'6"	Gray river silt with trace of vegetation	7	10'0"	1-			13-14	64-65
37'6"		8	11'6"	1-1			14-15	65-66
			11'6"	1-			15-16	66-67
			13'0"	1-2			16-17	67-68
37'6"	Gray sandy silt	9	13'0"	1-			17-18	68-69
40'0"		10	14'6"	1-1			18-19	69-70
			14'6"	1-			19-20	70-71
			16'0"	1-2			20-21	71-72
40'0"	Silt, sand, gravel and decomposed granite	11	16'6"	1-			21-22	72-73
43'0"		12	18'0"	1-1			22-23	73-74
			18'0"	1-			23-24	74-75
			19'6"	1-1			24-25	75-76
40'0"	Gray decomposed gneiss	13	19'6"	1-			25-26	76-77
44'0"		14	21'0"	1-1			26-27	77-78
			21'0"	1-			27-28	78-79
			22'6"	0-1			28-29	79-80
44'0"	Gray soft to medium hard decomposed gneiss	15	22'6"	1-			29-30	80-81
49'0"		16	24'0"	0-1			30-31	81-82
			24'0"	2-			31-32	82-83
			25'6"	2-2			32-33	83-84
			25'6"	1-			33-34	84-85
			27'0"	2-1			34-35	85-86
			27'0"	1-			35-36	86-87
			28'6"	2-1			36-37	87-88
			28'6"	1-			37-38	88-89
			30'0"	2-2			38-39	89-90
			30'0"	1-			39-40	90-91
			31'6"	0-1			40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

PIPE AND CASING LEFT IN HOLE

DISTANCE HAMMER DROP

30 INCH

DEPTH	TIME	DATE
5'0"	4 pm	2/3/76
4'6"	4 pm	2/4/76

SIZE	AMOUNT	REASON
	none	

DRIVE HAMMER _____ LBS.

SPOON HAMMER 140 LBS.

CASING SIZE 1 1/2 INCH

SPOON SIZE 2 INCH

SIZE OF CORE BIT 1 1/2 INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.43

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.
HOLE NO. 20 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 1/30 To 2/3 19 76

BORING LOG

SPOON SAMPLE AND CORE DATA

BLOWS ON CASING

DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER FT. ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
		21	31'6"- 33'0"	1- 1-2			1-2	52-53
		22	33'0"- 34'6"	2- 1-2			2-3	53-54
		23	34'6"- 36'0"	1- 1-2			3-4	54-55
		24	36'0"- 37'6"	1- 1-1			4-5	55-56
		25	37'6"- 39'0"	4- 3-4			5-6	56-57
		26	39'0"- 40'6"	2- 4-8			6-7	57-58
		27	40'6"- 42'0"	5- 11-28			7-8	58-59
		28	42'0"- 43'6"	21- 17-47			8-9	59-60
			44'0"- 49'0"		24" Core		9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

PIPE AND CASING LEFT IN HOLE

DISTANCE HAMMER DROP _____ INCH

DEPTH	HOUR	DATE

SIZE	AMOUNT	REASON

DRIVE HAMMER _____ LBS.

SPOON HAMMER _____ LBS.

CASING SIZE _____ INCH

SPOON SIZE _____ INCH

SIZE OF CORE BIT _____ INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller _____

Helper _____

Helper C-1.44

Not responsive due to revised scope

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

U. S. G. I. REFERENCE PROPERTY

(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.

BOLE NO. 21 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 2/6 To 2/9 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER 5" ON SAMPLES	ROCK CORE RECOVERED	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOVER'D - NO. PCS. REMARKS *	0-1	51-52
0'0" - 10'6"	Gray-brown silt, cinders and gravel, miscellaneous fill	1	0'0" - 1'6"	5-7		Dry	1-2	52-53
		2	1'6" - 6'6"	36-10-7		Damp	2-3	53-54
							3-4	54-55
							4-5	55-56
							5-6	56-57
							6-7	57-58
10'6" - 15'0"	Gray organic silt	3	10'0" - 11'6"	2-2		Damp	7-8	58-59
		4	11'6" - 15'0"	5-			8-9	59-60
							9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
15'0" - 18'0"	Reddish-brown fine sandy silt and gravel	5	20'0" - 21'6"	35-28-52		Damp	13-14	64-65
		6	21'6" - 22'6"	54-			14-15	65-66
							15-16	66-67
							16-17	67-68
18'0" - 25'0"	Brown decomposed gneiss	7	22'6" - 26'0"	76-82		Damp	17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

DEPTH	HOUR	DATE
12'	5 pm	2/9/76

PIPE AND CASING LEFT IN HOLE

SIZE	AMOUNT	REASON

DISTANCE HAMMER DROPPED

DRIVE HAMMER	300 LBS.
SPOON HAMMER	140 LBS.
CASING SIZE	NX INCH
SPOON SIZE	2 INCH
SIZE OF CORE BIT	INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.45

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.
HOLE NO. 22 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 1/2' To 1/30 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX 6" ON SAMPLES	ROCK CORE RECOVERED	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOVERY - NO. PCS. REMARKS *	0-1	51-52
0'0"	Silt, concrete, sand, gravel, glass, fill	1	0'0"- 1'6"	3- 3-5			1-2	52-53
8'0"		2	5'0"- 7'0"	Taken from refuse - tube			2-3	53-54
8'0"	Gray river silt	U3	11'0"- 13'0"	Push	22"	3" Shelby Tube	3-4	54-55
20'0"		U4	15'0"- 17'0"	Push	23"	3" Shelby Tube	4-5	55-56
30'0"	Gray river silt with some vegetation	5	20'0"- 21'6"	1- 1-1			5-6	56-57
38'0"		6	25'0"- 26'6"	1- 1-2			6-7	57-58
38'0"	Sand, gravel and decomposed granite	7	30'0"- 31'6"	1- 1-1			7-8	58-59
42'0"		8	35'0"- 36'6"	1- 1-2			8-9	59-60
42'0"	Soft decomposed gneiss	9	40'0"- 41'6"	30- 37-60			9-10	60-61
47'0"		10	41'6"- 42'0"	80 Ref.		Used 300 lb. hammer	10-11	61-62
47'0"	Gray hard weathered gneiss						11-12	62-63
52'0"			42'0"- 47'0"		2"		12-13	63-64
			47'0"- 52'0"		54"		13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
DATE	TIME	DEPTH	SIZE	AMOUNT	REASON	INCH	LBS.	INCH
1/30/76	4 pm	5'						
2/03/76	1 pm	5'						

PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
SIZE	AMOUNT	REASON	INCH	LBS.	INCH

PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP		
SIZE	AMOUNT	REASON	INCH	LBS.	INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

C-1.46

Not responsive due to revised scope

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

B. P. Kelly Property

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.LOCATION: Marcus Hook, Pa.HOLE NO. B-23 SURFACE ELEVATION _____

RIG NO. _____

DATE: _____

From 5/13To 5/1319 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDI: TURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D - NO. PCS. REMARKS *	0-1	51-52
0.0' 8.0'	Fill, silty sand with gravels	1	0.0'- 1.5'	4- 7-11			1-2	52-53
		2	5.0'- 6.5'	1- 1-2			2-3	53-54
8.0' 20.0'	Silty sand with cobbles	3	10.0'- 11.5'	18- 17-12			3-4	54-55
		4	15.0'- 16.5'	11- 17-30			4-5	55-56
21.0' 25.5'	Gray decomposed gneiss	5	20.0'- 21.5'	8- 19-50		Top of rock--21.0'	5-6	56-57
		6	25.0'- 25.5'	75			6-7	57-58
25.5' 30.5'	Gray gneiss, weathered		25.5'- 30.5'		42"		7-8	58-59
							8-9	59-60
							9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
						20' of NX casing used in hole	31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

DEPTH	HOUR	DATE
4.9'	0	5/13/76

PIPE AND CASING LEFT IN HOLE

SIZE	AMOUNT	REASON
	None	

DISTANCE HAMMER DROP

DRIVE HAMMER	300 LBS.
SPOON HAMMER	140 LBS.
CASING SIZE	NX INCH
SPOON SIZE	2 INCH
SIZE OF CORE BIT	NXM INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.47

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

WELL NO.	24	SURFACE ELEVATION	RIG NO.	DATE:	From	2/11	To	2/12	19	76
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[illegible]

GROUND WATER		
WELL NO.	DATE	

PIPE AND CASING LEFT IN HOLE		
SIZE	AMOUNT	REASON

DISTANCE HAMMER DROP 24-30 INCH
DRIVE HAMMER 300 LBS.
SPOON HAMMER 140 LBS.
CASING SIZE NX INCH
SPOON SIZE 2 INCH
SIZE OF CORE BIT _____ INCH

45-46	96-97
46-47	97-98
47-48	98-99
48-49	99-100
49-50	100-101
50-51	101-102

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C-1.48

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc.

LOCATION: Marcus Hook, Pa.

HOLE NO. 25 SURFACE ELEVATION RIG NO. DATE: From 2/13 To 2/13 19 76

BORING LOG			SPOON SAMPLE AND CORE DATA				BLOWS ON CASING	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER XX 6" ON SAMPLES	ROCK CORE RECOV'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOV'D -- NO. PCS. REMARKS *	0-1	51-52
0'0" 4'0"	Gray organic silt	1	0'0"- 1'6"	Wt. of hammer		Soft, moist	1-2	52-53
		2	2'0"- 3'6"	Wt. of hammer		Soft, moist	2-3	53-54
4'0" 7'0"	Reddish-brown fine to medium sandy silt, some gravel	3	5'0"- 6'6"	15- 20-25		Moist	3-4	54-55
		4	10'0"- 11'6"	24- 31-57		Damp	4-5	55-56
7'0" 11'6"	Brown decomposed gneiss						5-6	56-57
							6-7	57-58
							7-8	58-59
							8-9	59-60
							9-10	60-61
							10-11	61-62
							11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER			PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP 24-30 INCH		
DATE	TIME	DEPTH	SIZE	AMOUNT	REASON	DRIVE HAMMER	SPOON HAMMER	CASING SIZE
						300 LBS.	140 LBS.	NX INCH
								2 INCH

PIPE AND CASING LEFT IN HOLE			DISTANCE HAMMER DROP 24-30 INCH		
SIZE	AMOUNT	REASON	DRIVE HAMMER	SPOON HAMMER	CASING SIZE
			300 LBS.	140 LBS.	NX INCH
					2 INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller Not responsive due to revised scope

Helper

Helper

C-1.49

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINAL
(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME: Metcalf & Eddy, Inc. LOCATION: Marcus Hook, Pa.
HOLE NO. 26 SURFACE ELEVATION _____ RIG NO. _____ DATE: From 1/28 To 1/29 19 76

BORING LOG		SPOON SAMPLE AND CORE DATA					BLOWS ON CASIN	
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM-TO	BLOWS PER 6" ON SAMPLES	ROCK CORE RECOVER'D	D=DRY U=UNDISTURBED T=TRAP W=WASH R=ROD C=CORE CORE RECOVER'D -- NO. PCS. REMARKS *	0-1	51-52
0'0" 3'0"	Silt, gravel, concrete, sand, asphalt, fill	1	0'0"-1'6"	12-15			1-2	52-53
		2	1'6"-6'6"	7-8			2-3	53-54
3'0" 8'0"	Brown and gray silt	3	10'0"-11'6"	2-3			3-4	54-55
		4	15'0"-16'6"	1-2			4-5	55-56
8'0" 20'0"	Gray river silt	5	20'0"-21'6"	2-3			5-6	56-57
		6	25'0"-26'6"	18-21			6-7	57-58
20'0" 22'0"	Gray silty fine sand	7	30'0"-31'6"	12-20			7-8	58-59
		8	35'0"-36'6"	13-22			8-9	59-60
22'0" 27'0"	Brown fine-medium sand, gravel and silt						9-10	60-61
							10-11	61-62
27'0" 36'6"	Gray, white and brown decomposed gneiss						11-12	62-63
							12-13	63-64
							13-14	64-65
							14-15	65-66
							15-16	66-67
							16-17	67-68
							17-18	68-69
							18-19	69-70
							19-20	70-71
							20-21	71-72
							21-22	72-73
							22-23	73-74
							23-24	74-75
							24-25	75-76
							25-26	76-77
							26-27	77-78
							27-28	78-79
							28-29	79-80
							29-30	80-81
							30-31	81-82
							31-32	82-83
							32-33	83-84
							33-34	84-85
							34-35	85-86
							35-36	86-87
							36-37	87-88
							37-38	88-89
							38-39	89-90
							39-40	90-91
							40-41	91-92
							41-42	92-93
							42-43	93-94
							43-44	94-95
							44-45	95-96
							45-46	96-97
							46-47	97-98
							47-48	98-99
							48-49	99-100
							49-50	100-101
							50-51	101-102

GROUND WATER

DEPTH	TIME	DATE
6'6"	11 am	1/29/76
6'6"	8 am	1/30/76

PIPE AND CASING LEFT IN HOLE

SIZE	AMOUNT	REASON
	0000	

DISTANCE HAMMER DROP

DRIVE HAMMER	300 LBS.
SPOON HAMMER	140 LBS.
CASING SIZE	4" NX INCH
SPOON SIZE	2 INCH
SIZE OF CORE BIT	INCH

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

Not responsive due to revised scope

C-1.50

Commonwealth of Pennsylvania
Department of Environmental Resources
Solid Waste Management

Permit Number

ORIGINAL
(Red)

APPLICATION FOR PERMIT FOR SOLID WASTE
DISPOSAL and/or PROCESSING FACILITIES

See INSTRUCTIONS on Reverse Side

<p>1. Applicant (Name and Address) BP OIL, Incorporated P. O. Box 428 Marcus Hook, Delaware County, Pennsylvania 19061</p>	<p>2. Authorized Agent (Name, Title and Address) L. Bubri Superintendent Engineering BP OIL Incorporated P. O. Box 428 Marcus Hook, Delaware County Pennsylvania 19061</p>	<p>DEPT. USE ONLY ID. No. _____ Date Rec'd _____ Publ. Date _____ Date Issued _____</p>
<p>3. Property Owner(s) (Name and Address) BP OIL, Incorporated P. O. Box 428 Marcus Hook, Pa. 19061</p>	<p>4. Type of Operation <u>SLUDGE PROCESSING</u> 5. Name of Facility <u>Marcus Hook Refinery</u> Address of Facility <u>P.O. Box 428 Post Road</u> <u>Marcus Hook, PA.</u> ZIP <u>19061</u> City-Borough-Township <u>Marcus Hook</u> County <u>Delaware</u></p>	
<p>6. U.S.G.S. Map Location of Facility <u>Marcus Hook</u> Map Name <u>QUADRANGLE</u> Date <u>1967</u> 7.5' Quad <input checked="" type="checkbox"/> 15' Quad <input type="checkbox"/> Provide 7.5' Quad if published Center of Facility: LAT. <u>39° 49' 00"</u> LONG. <u>75° 24' 30"</u> Facility location measured from S.E. corner of Map: N.E. Corner - NORTH <u>12.6</u> in. WEST <u>4.7</u> in. N.W. Corner - NORTH <u>12.55</u> in. WEST <u>4.75</u> in. S.E. Corner - NORTH <u>12.5</u> in. WEST <u>4.6</u> in. S.W. Corner - NORTH <u>12.4</u> in. WEST <u>4.7</u> in.</p>	<p>7. General Information: Existing <input checked="" type="checkbox"/> Proposed <input type="checkbox"/> Number of acres proposed for permit <u>1.0</u> Total acres of the property <u>350.0</u> Planned life of the facility <u>N/A</u> years Has this facility been included as a part of the Solid Waste Management Plan for the area? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Is County Commission's approval required? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p>	
<p>8. The following documents are attached where applicable: Site Application Module phase I <input checked="" type="checkbox"/> phase II <input checked="" type="checkbox"/> Ground Water Module phase I <input type="checkbox"/> phase II <input type="checkbox"/> U.S.G.S. Topo Map <input type="checkbox"/> U.S.D.A. Soils Map <input type="checkbox"/> Large Scale Topo Map <input type="checkbox"/> (Min. scale 1" = 200') Design and Operational Plan(s) <input checked="" type="checkbox"/> Incinerator Modules A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/></p>	<p>9. Documents prepared by: (Name, Title and Address) Bruce A. McCrodden Engineering Supervisor Environmental BP OIL, Incorporated P. O. Box 428 Marcus Hook, Pennsylvania 19061 Telephone Number _____</p>	
<p>10. AFFIDAVIT: COMMONWEALTH OF PENNSYLVANIA SS: COUNTY OF <u>Delaware</u> Sworn and subscribed to before me this <u>18th</u> Day of <u>July</u>, 19 <u>75</u> <u>Gustave E. Chew, Jr.</u> NOTARY PUBLIC BOX 428, MARCUS HOOK, PENNA. MY COMMISSION EXPIRES JULY 1, 1978</p>		<p>PRINT or TYPE Name to be Signed: Date: I, <u>L. Bubri</u> being duly sworn according to law, depose and say that I (am the applicant) (am an officer or official of the applicant) (have the authority to make this application) and that the documents and statements submitted as part of this application are true and correct to the best of my knowledge and belief. Signature <u>L. Bubri</u></p>

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICESSOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE
PHASE IORIGINAL
(Red)

For Department of Health Use Only

PREPARED BY (Name & Address)

PART I - LAND DISPOSAL FACILITY

A. SITE IDENTIFICATION

1. NAME OF SITE BP OIL, Incorporated Marcus Hook Refinery2. ADDRESS OF SITE P. O. Box 428
Marcus Hook, Pa., 19061

3. SITE ACQUISITION (Check Appropriate Block)

PRESENTLY OWNED
WILL PURCHASEWILL LEASE FOR _____ YEARS
WILL RENT4. OWNER OF RECORD (Name & Address) BP OIL Corporation
P. O. Box 428
Marcus Hook, Pennsylvania 19061

B. FACILITY INFORMATION

1. IS THIS AN EXISTING FACILITY? ☒ Yes ☐ No
2. IS THIS A PROPOSED FACILITY? ☐ Yes ☒ No

PART II - GOVERNMENTAL APPROVAL

A. SITE APPROVAL FROM COUNTY AND MUNICIPALITY

1. IF THE SITE WILL BE IN A MINE, HAS THE PROPOSED SITE BEEN APPROVED BY THE COUNTY IN WHICH THE SITE IS LOCATED? N/A ☐ Yes ☐ No
2. HAS THE PROPOSED SITE BEEN APPROVED BY THE MUNICIPALITY IN WHICH IT WILL BE LOCATED? N/A ☐ Yes ☐ No

B. REQUIREMENTS

1. ARE THERE ANY CERTIFICATES, PERMITS, OPERATION REQUIREMENTS, OR LICENSES REQUIRED BY ANY OF THE FOLLOWING:

A. MUNICIPALITY? (If Yes, Describe) _____ ☐ Yes ☒ NoB. PLANNING COMMISSION? (If Yes, Describe) _____ ☐ Yes ☒ No

C-2.1

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL RESOURCES
 COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING
 SITE APPLICATION MODULE

PHASE I

ORIGINAL
 (Red)

For Department of Health Use Only

B. REQUIREMENTS - CONTINUED

C. COUNTY? (If Yes, Describe) _____

☐ Yes☒ No

D. STATE DEPARTMENT OF MINES AND MINERALS? (If Yes, Describe) _____

☐ Yes☒ No

E. OTHER? (If Yes, Describe) _____

☐ Yes☒ No**C. ZONING**1. CLASSIFICATION OF SITE INDUSTRIAL2. ENFORCEMENT AGENCY Boro of Trainer, Pennsylvania

3. WILL ZONING OF SITE PERMIT SANITARY LANDFILL?

☒ Yes☐ No4. RESTRICTIONS (If Any) None

5. ADJACENT PROPERTIES WITHIN A QUARTER-MILE (Check Appropriate Blocks Which Indicate The Use Of Adjacent Properties Surrounding The Site)

	North	East	South	West
A. RESIDENTIAL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. COMMERCIAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C. LIGHT INDUSTRIAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. HEAVY INDUSTRIAL	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. AGRICULTURAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. MIXED	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. NONE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE
PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

PART I – SOLID WASTE CHARACTERISTICS

SOURCE, TYPE, AND VOLUME OF WASTES(CHECK THE SOURCE AREA, GIVE A BRIEF DESCRIPTION OF THE TYPE OF PRESENT WASTE AND 10-YEAR PROJECTED VOLUME – IF THE PROPOSED LIFE OF THE LANDFILL IS LESS THAN 10 YEARS, WHAT IS THE PROJECTED VOLUME OF WASTE IN THE FINAL YEAR OF LANDFILL OPERATION? SUBMIT CHEMICAL ANALYSES OF HAZARDOUS WASTES WHICH ARE PROPOSED TO BE ACCEPTED OR ARE BEING ACCEPTED BY THE LANDFILL.)

A. SOURCE	TYPE (Description)	PRESENT VOL. – TONS	PROJECTED VOL. (10 YRS) – TONS
1. RESIDENTIAL			
2. COMMERCIAL			
3. INDUSTRIAL	OILY SLUDGE	15,000	
4. AGRICULTURAL			
5. OTHER (EXPLAIN)			

ADDITIONAL COMMENTS ON SOURCE, TYPE, AND VOLUME OF WASTE Oily Sludge to be
Processed and disposed offsite in accordance with the
attached Operation Plan.

B. DAILY WASTE QUANTITIES (INDICATE AMOUNT OF WASTE THE LANDFILL WILL ACCEPT EACH DAY, STATED IN VOLUME OR WEIGHT.)

	VOLUME	WEIGHT
1. ESTIMATED PER CAPITA DAILY WASTE QUANTITIES	N/A	N/A
2. MAXIMUM DAILY VOLUME OR WEIGHT	N/A	N/A
3. MINIMUM DAILY VOLUME OR WEIGHT	N/A	N/A
4. AVERAGE DAILY VOLUME OR WEIGHT	N/A	N/A
5. RATIO (MAX. OVER MIN.)	N/A	N/A

PART II – LANDFILL DESIGN AND OPERATION

A. DETAILED PLANS AND MAPS OF LANDFILL

SUBMIT ONE COPY OF EACH SET OF PLANS AND MAPS WITH EACH MODULE. THE FRONT COVER OR FLYLEAF OF EACH SET OF DRAWINGS AND SPECIFICATIONS MUST BEAR THE SIGNATURE AND SEAL OF THE REGISTERED PROFESSIONAL ENGINEER. EACH DRAWING MUST BEAR AN IMPRINT OR REASONABLE FACSIMILE OF SUCH SEAL.

1. PROPERTY LINE MAP

A. ONE MAP SHOULD INDICATE PROPERTY LINES OF SITE, USE OF ADJACENT PROPERTIES, AND SHOULD SHOW ALL RIGHT-OF-WAYS (FUEL AND POWER LINES, ROADS, ETC.)

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE

PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

A. DETAILED PLANS AND MAPS OF LANDFILL - CONTINUED

(1) IF RIGHT-OF-WAYS EXIST, NAME OF OWNER/COMPANY N/A(2) DOES OWNER OR OPERATOR OWN MINERAL RIGHTS? ☐ Yes ☐ No(3) IF NOT, NAME AND ADDRESS OF OWNER OF MINERAL RIGHTS N/A

2. DETAILED TOPOGRAPHIC MAP(S) OF SITE SHOULD INCLUDE THE FOLLOWING:
(MORE THAN ONE MAP MAY BE USED TO SHOW THE REQUIRED INFORMATION LISTED BELOW)

A. SCALE (1:200' OR LARGER, MEANING RATIO LARGER THAN .005) N/AB. 5' CONTOUR INTERVAL N/AC. LOCATION OF ACCESS ROADS AND ROADS ON LANDFILL N/AD. LOCATION OF FENCING N/AE. LOCATION OF WEIGHING FACILITIES N/A

F. LOCATION OF EXISTING AND PROPOSED UTILITIES N/A
(IF EXISTING FACILITIES ARE LOCATED FARTHER THAN A QUARTER-MILE
FROM THE SITE, THEY MAY BE SHOWN ON PROPERTY LINE MAP.)

G. LOCATION OF HIGH-TENSION POWER LINE RIGHT-OF-WAYS N/AH. LOCATION OF DISCHARGE POINT OF GROUND WATER N/A

I. LOCATION OF AND IDENTITY OF MONITORING WELLS, SPRINGS, AND
WELLS DRILLED AT HIGHEST ELEVATION N/A

J. DIRECTION OF GROUND WATER FLOW (IF MORE THAN ONE DIRECTION OF GROUND
WATER FLOW, INDICATE OTHER DIRECTIONS ALSO.) N/A

K. LOCATION OF: (PLACE THE FOLLOWING INFORMATION ON THE DETAILED TOPOGRAPHIC
MAP IF IT IS WITHIN THE SITE OR WITHIN A QUARTER-MILE OF THE OUTER PERIMETER OF
THE SITE: CHECK EACH ITEM BELOW AS IT IS PLACED ON THE MAP.)

N/A

☐ WELLS☐ SOIL STOCKPILE☐ POWER LINE RIGHT-OF-WAYS☐ SPRINGS☐ FIRE HYDRANTS☐ FUEL LINE RIGHT-OF-WAYS☐ SWAMPS☐ OTHER BODIES OF WATER☐ LIFTS☐ STREAMS☐ UNDERGROUND & SURFACE MINES☐ WATER TOWERS☐ PUBLIC WATER SUPPLIES☐ MINING SPOIL PILES☐ DIVERSION DITCHES☐ FIRE PONDS☐ GAS & OIL WELLSC-2.4²⁻²

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE
PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

A. DETAILED PLANS AND MAPS OF LANDFILL - CONTINUED**3. LIFT DESIGN (CHECK EACH ITEM AS IT IS INCLUDED ON THE DETAILED PLANS.)**

A. TOTAL THICKNESS OF EACH LIFT

N/A

B. WORKING GRADE OF EACH LIFT

N/A

C. SLOPE AND WIDTH OF WORKING FACE

N/A

D. APPROXIMATE TIME INTERVAL BETWEEN LIFTS

N/A

E. SEQUENCE OF LIFTS AND COVER MATERIAL USAGE IN FILL AREA

N/A

F. FINAL SLOPE SEQUENCE

N/A

G. COVER SUPPLY SOURCES

N/A

H. DRAINAGE DEVICES

N/A

4. PLANS FOR FINISHED SITE (CHECK EACH ITEM INCLUDED)

A. SHOW IN GENERAL:

SLOPE AND CONTOURS

N/A

OTHER (EXPLAIN ON LIST)

N/A

5. ONE BORING OR WELL IS REQUIRED NEAR THE HIGHEST ELEVATION OF THE PROPOSED SITE. IT MUST BE TO A DEPTH OF 10 FEET INTO THE GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICHEVER IS DEEPER. (MAXIMUM DEPTH - 100 FEET). IF GROUND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALYSES OF GROUND WATER. (CHECK EACH ITEM AS COMPLETED.)

A. PROVIDE A COMPLETE LOG (DESCRIPTION) OF WELL

N/A

B. INDICATE METHOD OF DRILLING

N/A

6. LEACHATE COLLECTION AND TREATMENT PROPOSAL

A. LOCATION OF TREATMENT FACILITIES

N/A

B. CROSS-SECTIONS OF TREATMENT LAGOONS AND PROPOSED COLLECTION FACILITIES

N/A

C. LOCATION OF DISCHARGE POINTS OF TREATED LEACHATE

N/A

7. LOCATION OF PROPOSED GROUND WATER MONITORING POINTS MUST BE SHOWN ON DETAILED TOPOGRAPHIC MAP.

A. HAVE PROPOSED GROUND WATER MONITORING POINTS BEEN SUBMITTED?

N/A

☐ Yes☐ No**FOR DEPARTMENT OF HEALTH USE ONLY**

MONITORING WELL(S) OR SPRING(S) SITES ARE:

☐ APPROVED☐ DISAPPROVED

COMMENTS

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES
SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE
PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

B. GENERAL PLAN OF OPERATION (DESCRIBE; CHECK AS COMPLETED)

- | | | | |
|--|----------------|---|----------------|
| 1. PROPOSED LANDFILL METHOD | _____ | 10. EROSION CONTROL | _____ <u>X</u> |
| 2. SCHEDULE OF FILLING | _____ <u>X</u> | 11. TRAFFIC CONTROL | _____ |
| 3. SITE PREPARATION | _____ <u>X</u> | 12. FINAL COVER | _____ <u>X</u> |
| 4. DESIGNATION OF UNLOADING AREA | _____ <u>X</u> | 13. FINAL SLOPES | _____ <u>X</u> |
| 5. SIZE OF WORKING FACE | _____ | 14. PROPOSED REVEGETATION PROCEDURE | _____ |
| 6. CELL CONSTRUCTION | _____ | 15. COMPLETED SITE MAINTENANCE PROVISIONS | _____ |
| 7. COMPACTION & COVERING PRACTICE | _____ | 16. OTHER (SPECIFY) _____ | _____ |
| 8. PROVISIONS FOR BLOWING LITTER CONTROL | _____ | | _____ |
| 9. MANAGEMENT OF SURFACE WATER | _____ | | _____ |

PART III – LANDFILL OPERATIONAL SUPPORT**A. EQUIPMENT**

1. LIST TYPE, MODEL NUMBER; GIVE A BRIEF DESCRIPTION OF EQUIPMENT USED IN LANDFILL OPERATION.

N/A

- B. ACCESS ROADS, BRIDGES, OR TUNNELS** – ROADS (ALL-WEATHER ACCESS ROADS NEGOTIABLE BY LOADED COLLECTION VEHICLES SHALL BE PROVIDED TO THE ENTRANCE OF THE SITE OR FACILITY WHERE A PUBLIC ROAD DOES NOT EXIST. THE MINIMUM CARTWAY WIDTH FOR THE TWO-WAY TRAFFIC SHALL BE TWENTY-TWO (22) FEET, OR FOR ONE-WAY TRAFFIC (SEPARATE ROADS) A MINIMUM CARTWAY WIDTH OF TWELVE (12) FEET.)

1. PROVIDE THE FOLLOWING INFORMATION FOR PUBLIC ROADS LEADING TO THE DISPOSAL SITE:

ROUTE NUMBER	LOAD LIMIT (TONS)	TYPE (INSERT NUMBER) *	ROAD TYPES
_____	_____	_____	(1) CONCRETE
_____	_____	_____	(2) ASPHALT
_____	_____	_____	(3) GRAVEL
_____	_____	_____	(4) OTHER
_____	_____	_____	(Specify)
_____	_____	_____	

N/A

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES
SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE

PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

B. ACCESS ROADS, BRIDGES, OR TUNNELS - CONTINUED**2. PROVIDE THE FOLLOWING INFORMATION FOR ROADS ON THE LANDFILL:**

WIDTH	LENGTH	TYPE (INSERT NUMBER) *	*ROAD TYPES
			(1) CONCRETE
			(2) ASPHALT
			(3) GRAVEL
			(4) DIRT
			(5) OTHER (Specify)

N/A

3. BRIDGES (LIST LOCATION, HEIGHT & WEIGHT RESTRICTIONS - INCLUDE ONLY BRIDGES IN THE AREA LEADING TO THE LANDFILL.)

N/A

LOCATION	HEIGHT RESTRICTIONS	WEIGHT RESTRICTIONS

4. TUNNELS (LOCATION, HEIGHT RESTRICTIONS) N/A

TUNNEL	LOCATION	HEIGHT RESTRICTIONS

C. FIRE PROTECTION**1. FIRE DEPARTMENT**

A. NAME BP OIL, Incorporated

B. ADDRESS P. O. Box 428 Marcus Hook, Pennsylvania 19061

C. DISTANCE FROM SITE 0.5 Miles

2. POND

A. LOCATION N/A

B. VOLUME OF WATER N/a

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES
SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE

PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

C. FIRE PROTECTION - CONTINUED**3. SOIL STOCKPILE**A. LOCATION N/AB. VOLUME OF SOIL N/A**4. WATER UNDER PRESSURE**A. LOCATION Adjacent to Sludge LagoonB. VOLUME OF WATER 3000 GPMC. WATER PRESSURE 180 Psi**D. CONTROL PROGRAM (BRIEFLY DESCRIBE PROGRAM; BE SPECIFIC IF CHEMICALS OR PESTICIDES ARE TO BE USED.)**1. RODENT CONTROL N/A2. FLY CONTROL N/A3. BIRD CONTROL N/A4. DUST CONTROL N/A5. ODOR CONTROL N/A6. OTHER (EXPLAIN) N/A**E. PUBLIC UTILITIES**

	YES OR NO ON SITE	YES OR NO OFF SITE	DISTANCE FROM SITE TO UTILITY	DATE FACILITY WILL BE AVAILABLE ON THE SITE
1. WATER	<u>NO</u>			
2. COMMUNICATIONS (DESCRIBE TYPE)	<u>YES</u>	<u>Telephone</u>	<u>300 Feet</u>	<u>July 1975</u>

DATE PREPARED

7/17/75

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES
SOLID WASTE DISPOSAL AND/OR PROCESSING
SITE APPLICATION MODULE
PHASE II

ORIGINAL
(Red)

For Department of Health Use Only

F. EMPLOYEE FACILITIES

	YES OR NO ON SITE	YES OR NO OFF SITE	DISTANCE TO	DATE AVAILABLE
1. SHELTER	<u>YES</u>		<u>300 Feet</u>	<u>July 1975</u>
2. DRINKING WATER (DESCRIBE)	<u>YES</u>		<u>300 Feet</u> <u>Portable Containers</u>	<u>July 1975</u>
3. TOILET FACILITIES	<u>YES</u>		<u>300 Feet</u>	<u>July 1975</u>
4. LAVATORIES	<u>NO</u>			
5. SHOWERS	<u>NO</u>			
6. DESCRIBE SEWAGE SYSTEM (IF OTHER THAN PUBLIC SEWER) <u>Portable Toilets with waste</u> <u>collected for offsite disposal.</u>				

G. WEIGHING AND MEASURING FACILITIES

1. SCALES

A. DESCRIPTION N/AB. LOCATION N/A

2. OTHER (SPECIFY)

A. TYPE N/AB. DESCRIPTION N/AC. LOCATION N/A**H. ENGINEER**1. NAME Bruce A. McGrodden3. REGISTRATION NUMBER 20446-E2. ADDRESS BP OIL, Incorporated4. SIGNATURE Bruce A McGrodden
P. O. Box 428
Marcus Hook, Pennsylvania 19061

5. SEAL OF REGISTERED PROFESSIONAL ENGINEER

SEAL

PLAN OF OPERATION
SLUDGE LAGOON ELIMINATION
BP OIL, INCORPORATED
MARCUS HOOK REFINERY

Phase I

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill. Disposal will be at KinBuc landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase II

To be accomplished in conjunction with or shortly after Phase I. The parking lot area due west of the lagoon will be excavated to form a series of dikes to contain the Chemfix solids for curing. On both the lagoon and disposal area sides, diking will be arranged to collect any natural or liquid runoff in order that it may be diverted to the refinery oily waste sewer system.

All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the State's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills. An average of two feet of freeboard will be maintained. This specification prohibits the entire processing of the lagoon at

C-2.11

one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the lagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul-off sequence. Disposal of the Chemfixed material will be at Kinsley Landfill in Depthford, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above. This material will be disposed at KinBuc Landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

DATE PREPARED 4/29/77
DATE REVISED

**MODULE 5A - PHASE II
GROUND WATER QUALITY
MONITORING INFORMATION**

ORIGINAL (Red)
FOR DEPARTMENT USE ONLY

CASE IDENTIFICATION

Name BP OIL INC. - Marcus Hook Refinery
Municipality Trainer
County Delaware
Permit No. 2376203

FOR DEPARTMENT USE ONLY	
REVIEWED BY _____	DATE _____
RECOMMEND APPROVAL _____	DISAPPROVAL _____
CONDITIONS _____	

NOTE: Phase II must be completed within 60 days after the monitoring points are approved and the permit is issued.

I. For approved monitoring sites complete the following:

A. Wells

1. Location

MONITORING POINT NUMBERS*	BACKGROUND OR DOWN GRADIENT	NAME DATE AND SERIES OF TOPOGRAPHIC MAP	LOCATION MEASURED FROM SOUTHEAST CORNER		Southeast Corner N 1620 E 1550	
			INCHES NORTH	INCHES WEST	Feet North	Feet West
1	Down Gradient	Impounding Pond	3.75	6.75	150	270
2	Inside Slurry Wall	Slurry Wall Detail	3.75	5.75	150	230
3	Background	Drawing S-1	-1.0	- .125	-40	-5
4	Background	Oct. 11, 1976	8.875	-13.75	355	-550

*Number all monitoring points consecutively. Example: Wells 1, 2, 3; Springs 4, 5, 6; Others 7, 8.
These numbers must not be changed; they will be used in all subsequent reports and communications (use numbers only).

C-3.0

DATE PREPARED
4/29/77

DATE REVISED

MODULE 5A - PHASE II
GROUND WATER QUALITY
MONITORING INFORMATION

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

2. Completion Data

MONITORING POINT NUMBERS*	METHOD DRILLED	DATE COMPLETED	DEPTH	SURFACE ELEVATION (Plant Datum)	DEPTH TO STATIC WATER LEVEL	DATE OF MEASUREMENT
1	Auger	Feb., 1977	13.0	13.0	1.0	4/11/77
2	Auger	Feb., 1977	13.0	13.0	5.0	4/11/77
3	Auger	Feb., 1977	13.0	13.0	5.0	4/11/77
4	Auger	Feb., 1977	13.0	13.0	6.0	4/11/77

Completion Data Continued:

MONITORING POINT NUMBERS*	CASING:				GROUTING:	
	MATERIAL (TYPE)	SIZE DIAMETER (INCHES)	ZONES: CASED	ZONES PERFORATED	ZONES GROUTED	TYPE OF GROUTING
1	Steel Pipe	15	3Ft.	10 Ft.	N/A	N/A
2	Steel Pipe	15	3Ft.	10 Ft.	N/A	N/A
3	Steel Pipe	15	3Ft.	10 Ft.	N/A	N/A
4	Steel Pipe	15	3Ft.	10 Ft.	N/A	N/A

a. Does each well have a minimum of 3.5 inch diameter entrance port for samplers? ☒ YES ☐ NO

b. If the entrance port is not provided, indicate how samples of the upper foot of ground water will be secured. _____

*Number all monitoring points consecutively. These numbers must not be changed; they will be used in all subsequent reports and communications (use numbers only).

C-3.1

DATE PREPARED

4/29/77

DATE REVISED

MODULE 5A - PHASE II
GROUND WATER QUALITY
MONITORING INFORMATIONORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

3. Pump Test Data N/A

MONITORING POINT NUMBER					
USE OF WATER OTHER THAN MONITORING (FIRE, DOMESTIC, SANITARY FACILITIES, ETC.)					
PUMP					
TYPE					
RATED CAPACITY					
DEPTH TO PUMP (Ft.)					
DEPTH TO WATER INTAKE (Ft.)					
PUMP TEST DATA					
BAILED OR PUMPED AT (GPM-UNIFORM RATE)					
STATIC WATER LEVEL (PRIOR TO START OF PUMPING) (Ft.)					
PUMPING WATER LEVEL (AT END OF PUMP TEST) (Ft.)					
DRAWDOWN (Ft.)					
LENGTH OF PUMP TEST (Hrs.)					
SPECIFIC CAPACITY (GPM/Ft.)					
PUMPING RATE DRAWDOWN					

a. Are the required geologic logs attached for each well?

☐ YES ☐ NO

C-3.2

DATE PREPARED

4/29/77

DATE REVISED

MODULE 5A - PHASE II
GROUND WATER QUALITY
MONITORING INFORMATION

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

B. Springs

N/A

1. Locations

MONITORING POINT NUMBERS*	BACKGROUND OR DOWN GRADIENT	NAME & DATE OF TOPOGRAPHIC MAP	MEASURED FROM SOUTHEAST CORNER	
			INCHES NORTH	INCHES WEST

2. Flow Data

MONITORING POINT NUMBER*	ELEVATION OF DISCHARGE POINT	RATE OF FLOW GPM	DATE OF MEASUREMENT

C. Other(s)

N/A

MONITORING POINT NUMBER*	DESCRIBE OR EXPLAIN	LIST PERTINENT INFORMATION (FLOW, DEPTH TO GROUND WATER, ELEVATIONS, ETC.)

*Monitoring point numbers should be numbered consecutively. Example: Wells 1, 2, 3;
Springs 4, 5, 6; others 7, 8.

C-3.3

ORIGINAL
(Red)

June 21, 1977

SUBJECT: Industrial Waste Permit
BP Oil Company
Trainer Borough, Delaware County

TO: John Kennedy
Sanitary Engineer

THRU: Walter E. Stanley
Operations, Chief

FROM: Paul M. Yaniga
Geologist

AND
Richard L. Hinkle
Facilities Chief

I have reviewed the Phase II module and monitoring well data and have the following comments:

1. Noted are marked down gradient increases in C.O.D., ammonia nitrogen, and alkalinity. Iron and manganese are also elevated in down gradient wells.
2. Increases in alkalinity and ammonia would tend to indicate bio degradation of organics when viewed in conjunction with the elevated C.O.D. value this would suggest current of past contamination by hydrocarbons.
3. Subsequent analyses from these monitoring points should include oils and grease.

cc: Groundwater Section
Re Ce 30

PMY:smc

D-1.0

DATE PREPARED

DATE REVISED

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

FOR DEPARTMENT USE ONLY

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 1

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

 Date sample collected:

M	D	Y
0	6	27

Time				
------	--	--	--	--

 NOTE: Use the
 2400 Time System

 Spring flow N/A Cu. Ft./sec.

--	--	--	--	--

 Depth to water level 2.8 feet

--	--	--	--	--

 Sampling depth 6.0 feet

--	--	--	--	--

 Type of sample taken: Pump Bailor X

 Temperature (°C)

		2	0	.	6
--	--	---	---	---	---

 pH

			7	.	3
--	--	--	---	---	---

 Alkalinity (mg/L)

		1	8	8	.	0
--	--	---	---	---	---	---

 Chloride (mg/L)

			4	0	.	4
--	--	--	---	---	---	---

 Fluoride (mg/L)

				0	.	9
--	--	--	--	---	---	---

 Total Phosphates as P (mg/L)

			0	.	0	6
--	--	--	---	---	---	---

 K-Jeldahl Nitrogen (mg/L)

			1	3	.	0
--	--	--	---	---	---	---

 For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE RECEIVED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

DO NOT WRITE IN THESE SPACES

Company Name BP OIL INC. County DELAWAREType of Installation PETROLEUM REFINERY Municipality TRAINERMonitoring point number 1Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	6
---	---

2	7
---	---

8	6
---	---

Time

0	7	3	0
---	---	---	---

NOTE: Use the
2400 Time SystemSpring flow N/A

Est. flow

FOR DEPT USE ONLY

--	--	--	--	--

Depth to water level 2.3 feet

--	--	--	--	--

Sampling depth 6.0 feet

--	--	--	--	--

Type of sample taken: Pump Sucker XNH₃ Nitrogen (mg/L)

		1	4	.	2
--	--	---	---	---	---

Total Solids (mg/L)

			4	1	0
--	--	--	---	---	---

Suspended Solids (mg/L)

				1	8
--	--	--	--	---	---

Settleable Solids

	T	R	A	C	E
--	---	---	---	---	---

BOD₅ (mg/L)

				1	8
--	--	--	--	---	---

COD .25 N K₂Cr₂O₇ (mg/L)

			1	3	0
--	--	--	---	---	---

Oil and Grease (mg/L)

					6
--	--	--	--	--	---

For Fluoride check one:

1. Colorimetric Method or 2. Selective ion probe X

For Manganese check one:

1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery LaboratoryBP Oil Inc.P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

One sample collected

C	6
---	---

2	7
---	---

8	6
---	---

 Time

0	7	3	0
---	---	---	---

NOTE: Use the 24-Hr Time System

Spring flow N/A Cu. Ft./Sec.

--	--	--	--

Depth to water level 2.3 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Sailer X

Total Iron (ug/L)	<table><tr><td></td><td></td><td></td><td></td><td>N</td><td>A</td></tr></table>					N	A
				N	A		
Aluminum (ug/L)	<table><tr><td></td><td></td><td></td><td></td><td>N</td><td>A</td></tr></table>					N	A
				N	A		
Manganese (ug/L)	<table><tr><td></td><td></td><td></td><td></td><td>N</td><td>A</td></tr></table>					N	A
				N	A		
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For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

NA - Not Available

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVISED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	6
---	---

2	7
---	---

8	6
---	---

 Time

0	7
---	---

3	5
---	---

NOTE Use the
2400 Time System

FOR DEPT. USE ONLY

Spring flow N/A Cu. Ft/sec

--	--	--	--

Depth to water level 3.5 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample Check one: Pump Sailer X

Temperature (°C)

		2	2		8
--	--	---	---	--	---

pH

			7		2
--	--	--	---	--	---

Alkalinity (mg/L)

		4	3		0
--	--	---	---	--	---

Chloride (mg/L)

			3		9
--	--	--	---	--	---

Fluoride (mg/L)

			0		6
--	--	--	---	--	---

Total Phosphates as P (mg/L)

		0		0	4
--	--	---	--	---	---

K-Jeldahl Nitrogen (mg/L)

			2		2
--	--	--	---	--	---

For Fluorides check one: 1. Colorimetric Method or 2. Selective ion probe X

For Metals check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O.Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

DO NOT WRITE IN THESE SPACES

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
0	6	27

 Time

--	--	--	--

NOTE: Use the
SAC Time System

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 35 feet

--	--	--	--

Sampling depth 5.0 feet

--	--	--	--

Type of sample taken: Pump Date X

NH₃ Nitrogen (mg/L)

			1	.	2

Total Solids (mg/L)

			1	2	0

Suspended Solids (mg/L)

				1	3

Settleable Solids

	T	R	A	C	E

BOD₅ (mg/L)

				<	2

COD .25 N K₂Cr₂O₇ (mg/L)

				3	2

Oil and Grease (mg/L)

		<	5	.	0

For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic Absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

Company Name BP OIL INC. County DELAWARE
Type of Installation PETROLEUM REFINERY Municipality TRAINER
Monitoring point number 2

Facility Name IMPOUNDING POND
Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	6
---	---

2	7
---	---

3	6
---	---

 Time

0	7
---	---

3	5
---	---

NOTE: Use the
24-60 Time System

FOR DEPT USE ONLY
Spring flow N/A Cu. Ft.

--	--	--	--

Depth to water level 3.5 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Boil X

Total Iron (ug/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table> <u>NA</u>						
Aluminum (ug/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table> <u>NA</u>						
Manganese (ug/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table> <u>NA</u>						
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	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						

For Nitrogen check one: 1. Colorimetric Method or 2. Selective ion probe X
For Lead check one: 1. Colorimetric Method or 2. Atomic absorption X

NA Not Available

Name and address of laboratory performing chemical analysis:
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19961

DATE PREPARED

DATE REVISED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 3

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
0	6	2

2	7	8	6
---	---	---	---

 Time

0	7	2	0
---	---	---	---

NOTE Use the
2400 Time System

FOR DEPT. USE ONLY

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 6.3 feet

--	--	--	--

Sampling depth 10.0 feet

--	--	--	--

Type of sample taken: Pump Sailer X

Temperature (°C)

			1	8	.	3
--	--	--	---	---	---	---

pH

			7	.	6
--	--	--	---	---	---

Alkalinity (mg/L)

		1	3	2	.	0
--	--	---	---	---	---	---

Chloride (mg/L)

		1	6	.	1
--	--	---	---	---	---

Fluoride (mg/L)

		0	.	3
--	--	---	---	---

Total Phosphates as P (mg/L)

		0	.	0	2
--	--	---	---	---	---

K-Jeldahl Nitrogen (mg/L)

		1	.	3
--	--	---	---	---

For Fluorides test one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate test one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

DO NOT WRITE IN THESE SPACES

DATE PREPARED

DATE REVIEWED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 3

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--

Site sample collected

0	6	2	7	8	6
---	---	---	---	---	---

Time

0	7	2	0
---	---	---	---

NOTE: Use the 24-Hour Time System

FOR DEPT USE ONLY

Spring flow N/A Cu. N/sec

--	--	--	--	--

Depth to water level 6.9 feet

--	--	--	--	--

Sampling depth 16.0 feet

--	--	--	--	--

Type of sample taken: Pump Sucker X

NH ₃ Nitrogen (mg/L)				0	.	2
Total Solids (mg/L)				2	8	0
Suspended Solids (mg/L)						7
Settleable Solids				N	I	L
BOD ₅ (mg/L)					<	2
COD .25 N K ₂ Cr ₂ O ₇ (mg/L)					3	5
Oil and Grease (mg/L)				<	5	0

For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X

For Manganese check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 3

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

One sample collected

--	--

--	--

--	--

--	--

 Time

--	--	--	--

NOTE: Use the
24-Hour Time System

FOR DEPT USE ONLY
Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 6.3 feet

--	--	--	--

Sampling depth 10 feet

--	--	--	--

Type of sample taken one: Pump Sailer X

Total Iron (ug/L)	<table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> <u>NA</u>						
Aluminum (ug/L)	<table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> <u>NA</u>						
Manganese (ug/L)	<table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> <u>NA</u>						
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For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X
For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

NA - NOT AVAILABLE

Name and address of laboratory performing chemical analysis:
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19761

DATE PREPARED

DATE REVISED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 41

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
0	6	27

 Time

H	M	S
0	7	45

 NOTE Use the DATE TIME SYSTEM

FOR DEPT. USE ONLY
Spring flow N/A Cu. Ft./sec.

--	--	--	--	--

Depth to water level 3.1 feet

--	--	--	--	--

Sampling depth 100 feet

--	--	--	--	--

Type of sample taken one: Pump Sailer X

Temperature (°C)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td>1</td><td>9</td><td>.</td><td>4</td></tr></table>			1	9	.	4	
		1	9	.	4			
pH	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td></td><td>7</td><td>.</td><td>6</td></tr></table>				7	.	6	
			7	.	6			
Alkalinity (mg/L)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td>1</td><td>3</td><td>5</td><td>.</td><td>0</td></tr></table>			1	3	5	.	0
		1	3	5	.	0		
Chloride (mg/L)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td>1</td><td>4</td><td>5</td><td>.</td><td>2</td></tr></table>			1	4	5	.	2
		1	4	5	.	2		
Fluoride (mg/L)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td></td><td>0</td><td>.</td><td>5</td></tr></table>				0	.	5	
			0	.	5			
Total Phosphates as P(mg/L)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td><</td><td>0</td><td>.</td><td>0</td><td>1</td></tr></table>			<	0	.	0	1
		<	0	.	0	1		
K-Jeldahl Nitrogen (mg/L)	<table border="1" style="display: inline-table;"><tr><td></td><td></td><td>0</td><td>.</td><td>4</td><td>5</td></tr></table>			0	.	4	5	
		0	.	4	5			

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

80-600-157
 DATE PREPARED
 DATE REVIEWED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
 WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
 FOR DELAWARE USE ONLY

Company Name BP OIL INC. County DELAWARE
 Type of Installation PETROLEUM REFINERY Municipality TRAINER
 Monitoring point number 4
 Facility Name IMPOUNDING POND
 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	6
---	---

2	7
---	---

8	6
---	---

 Time

0	7	4	5
---	---	---	---

 NOTE: Use the
 2400 Time System

Spring flow N/A Cu. Ft./sec.

--	--	--	--

 Depth to water level 81 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

Type of sample taken: Pump Sucker X

NH ₃ Nitrogen (mg/L)	< 0.1
Total Solids (mg/L)	570
Suspended Solids (mg/L)	9
Settleable Solids	NIL
BOD ₅ (mg/L)	< 2
COD .25 N K ₂ Cr ₂ O ₇ (mg/L)	13
Oil and Grease (mg/L)	< 5.0

For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X
 For Manganese check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

E-1.3.1

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

DO NOT WRITE IN THESE SPACES

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 4

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

One sample collected

0	6
---	---

2	7
---	---

3	6
---	---

 Time

0	7	4	5
---	---	---	---

NOTE Use the
24-Hr Time System

Spring Flow N/A Cu. Ft./Sec.

--	--	--	--	--

Depth to water level 3.1 feet

--	--	--	--	--

Sampling depth 12.0 feet

--	--	--	--	--

Type of sample taken: Pump Sailer X

Total Iron (ug/L)	NA
Aluminum (ug/L)	NA
Manganese (ug/L)	NA

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

NA - NOT AVAILABLE

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19761

DATE PREPARED

DATE RECEIVED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
0	9	2

2	5	8	6		

 Time

1	3	5	5		

NOTE: Use the
2400 Time System

FOR DEPT. USE ONLY

Spring flow N/A Cu. Ft./sec.

--	--	--	--	--	--

Depth to water level 2.8 feet

--	--	--	--	--	--

Sampling depth 10.0 feet

--	--	--	--	--	--

Type of sample Collect one: Pump Sailer X

Temperature (°C)

		2	0	.	6

pH

			7	.	1

Alkalinity (mg/L)

		2	7	2	.

Chloride (mg/L)

		5	6	.	8

Fluoride (mg/L)

			0	.	6

Total Phosphates as P (mg/L)

		0	.	1	5

K-Jeldahl Nitrogen (mg/L)

		1	3	.	0

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVIEWED

DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Site sample collected

0	9
---	---

2	5
---	---

8	6
---	---

 Time

1	3	5	5
---	---	---	---

NOTE: Use the
BAC Time System

Spring flow N/A Cu. ft/sec

--	--	--	--

Depth to water level 2.8 feet

--	--	--	--

Sampling depth 10.0 feet

--	--	--	--

Type of sample taken one. Pump Dredge X

NH₃ Nitrogen (mg/L)

		1	3	.	0
--	--	---	---	---	---

Total Solids (mg/L)

			4	8	0
--	--	--	---	---	---

Suspended Solids (mg/L)

				6	1
--	--	--	--	---	---

Settleable Solids

			N	I	L
--	--	--	---	---	---

BOD₅ (mg/L)

		1	1	.	0
--	--	---	---	---	---

COD .25 N K₂Cr₂O₇ (mg/L)

			1	7	0
--	--	--	---	---	---

Oil and Grease (mg/L)

		<	5	.	0
--	--	---	---	---	---

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Manganese check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

FOR DISPATCH ON FILE

Company Name BP OIL INC. County DELAWARE

TYPE of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number: _____

Facility Name IMPOUNDING POND

Facility Number

[illegible]

One week collected

M	D	Y	Time
0	9	25	86
1	3	55	

NOTE: Use the Date Time System

NOTE: Use the
SAFE TALK APP

Spring Row N/A G. W.

FOR OFFICE USE ONLY

--	--	--	--

Depth to water level 2.8 m:

--	--	--	--

Sounding depth 10,0 fms:

--	--	--	--

Type of engine: Gas Pump Boiler X

Total Iron (ug/L)

					NA
--	--	--	--	--	----

Aluminum (ug/L)

				N	A
--	--	--	--	---	---

Manganese (ug/L)

				N	A
--	--	--	--	---	---

--	--	--	--	--	--

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For each check one: 1. Colorimetric Method or 2. Atomic absorption

NA - Not Available

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19761

ORIGINAL
 (Red)

FOR DEPARTMENT USE ONLY

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 2

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

M	D	Y
0	9	2

2	5	8	6
---	---	---	---

 Date sample collected

1	3	4	5
---	---	---	---

 Time
 NOTE: Use the
2400 Time System

 Spring flow N/A Cu. Ft./sec.

--	--	--	--

 Depth to water level 2.8 feet

--	--	--	--

 Sampling depth 6.4 feet

--	--	--	--

 Type of sample taken: Pump Bailor X

 Temperature (°C)

		2	3	.	3
--	--	---	---	---	---

 pH

			7	.	0
--	--	--	---	---	---

 Alkalinity (mg/L)

		8	4	.	0
--	--	---	---	---	---

 Chloride (mg/L)

		1	4	.	4
--	--	---	---	---	---

 Fluoride (mg/L)

			0	.	4
--	--	--	---	---	---

 Total Phosphates as P (mg/L)

		0	.	1	8
--	--	---	---	---	---

 K-Jeldahl Nitrogen (mg/L)

			1	.	7
--	--	--	---	---	---

 For Fluorides check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Metals check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

DO NOT WRITE IN THESE SPACES

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	9	2	5	8	6
---	---	---	---	---	---

Time

1	3	4	5
---	---	---	---

NOTE: Use the
DATE TIME SYSTEM

Spring flow N/A Cu. Ft./sec

FOR DEPT. USE ONLY

Depth to water level 2.8 feet

Sampling depth 6.4 feet

Type of sample flask used: Pump Bottle X

NH₃ Nitrogen (mg/L)

			1	.	3
--	--	--	---	---	---

Total Solids (mg/L)

			3	0	0
--	--	--	---	---	---

Suspended Solids (mg/L)

			1	6	0
--	--	--	---	---	---

Settleable Solids

			0	.	1
--	--	--	---	---	---

BOD₅ (mg/L)

			1	1	.	0
--	--	--	---	---	---	---

COD .25 N K₂Cr₂O₇ (mg/L)

				3	5
--	--	--	--	---	---

Oil and Grease (mg/L)

		<	5	.	0
--	--	---	---	---	---

For Fluoride check one:

1. Colorimetric Method or 2. Selective Ion probe X

For Manganese check one:

1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

Company Name BP OIL INC. County DELAWARE
Type of Installation PETROLEUM REFINERY Municipality TRAINER
Monitoring point number 2
Facility Name IMPOUNDING POND
Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected: M

0	9
---	---

 D

2	5
---	---

 Y

8	6
---	---

 Time

1	3	4	5
---	---	---	---

 NOTE Use the
2400 Time System

FOR DEPT USE ONLY
Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 2.8 feet

--	--	--	--

Sampling depth 6.4 feet

--	--	--	--

Type of sample Collect one: Pump Boiler X

Total Iron (ug/L)					N	A
Aluminum (ug/L)					N	A
Manganese (ug/L)					N	A

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X
For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis: NA - Not Available
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVISED

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

 ORIGINAL
 (Red)

FOR DEPARTMENT USE ONLY

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 3

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

 Date sample collected

--	--	--	--	--	--

--	--	--	--	--

 Time

--	--	--	--	--

 NOTE: Use the
 2400 Time System

FOR DEPT. USE ONLY

 Spring flow N/A Cu. Ft./sec.

--	--	--	--

 Depth to water level 6.7 feet

--	--	--	--

 Sampling depth 8.3 feet

--	--	--	--

 Type of sample taken one: Pump Sailer X

 Temperature (°C)

--	--	--	--	--	--

 pH

--	--	--	--	--	--

 Alkalinity (mg/L)

--	--	--	--	--	--

 Chloride (mg/L)

--	--	--	--	--	--

 Fluoride (mg/L)

--	--	--	--	--	--

 Total Phosphates as P (mg/L)

--	--	--	--	--	--

 K-Jeldahl Nitrogen (mg/L)

--	--	--	--	--	--

 For Fluorides check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Metals check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O.Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVIEWED

 DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

 QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

 ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 3

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

One sample collected

0	9	2	5	8	6
---	---	---	---	---	---

Time

1	3	3	5
---	---	---	---

 NOTE: Use the
BASE Time System

 Spring flow N/A Cu. Ft./sec

FOR DEPT USE ONLY

--	--	--	--

 Depth to water level 6.7 feet

--	--	--	--

 Sampling depth 8.3 feet

--	--	--	--

 Type of sample taken one: Pump Dredge X
NH₃ Nitrogen (mg/L)

			1	.	5
--	--	--	---	---	---

Total Solids (mg/L)

			5	2	0
--	--	--	---	---	---

Suspended Solids (mg/L)

			2	3	0
--	--	--	---	---	---

Settleable Solids

			0	.	2
--	--	--	---	---	---

BOD₅ (mg/L)

			3	.	3
--	--	--	---	---	---

COD .25 N K₂Cr₂O₇ (mg/L)

				4	3
--	--	--	--	---	---

Oil and Grease (mg/L)

		<	5	.	0
--	--	---	---	---	---

For Fluoride check one:

 1. Colorimetric Method or 2. Selective Ion probe X

For Manganese check one:

 1. Colorimetric Method or 2. Atomic Absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 3

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected:

--	--

--	--

--	--

--	--

 Time

--	--	--	--

 NOTE: Use the
2400 Time System

Spring flow N/A Cu. Ft./sec.

--	--	--	--

 FOR DEPT USE ONLY

Depth to water level 6.7 feet

--	--	--	--

Sampling depth 8.3 feet

--	--	--	--

Type of sample taken: Pump Boil X

Total Iron (ug/L)						
Aluminum (ug/L)						
Manganese (ug/L)						

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

NA - Not Available

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

ORIGINAL
 (Red)

FOR DEPARTMENT USE ONLY

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 4

 Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

0	9	2	5	8	6
---	---	---	---	---	---

Time

1	4	0	5
---	---	---	---

 NOTE: Use the
 2400 Time System

 Spring flow N/A Cu. Ft./sec.

FOR DEPT. USE ONLY

--	--	--	--	--	--

 Depth to water level 7.8 feet

--	--	--	--	--	--

 Sampling depth 9.4 feet

--	--	--	--	--	--

 Type of sample taken one: Pump Sailer X

Temperature (°C)

		2	2	.	2
--	--	---	---	---	---

pH

			7	.	6
--	--	--	---	---	---

Alkalinity (mg/L)

	1	5	8	.	0
--	---	---	---	---	---

Chloride (mg/L)

	1	4	1	.	9
--	---	---	---	---	---

Fluoride (mg/L)

			0	.	3
--	--	--	---	---	---

Total Phosphates as P (mg/L)

		0	.	0	6
--	--	---	---	---	---

K-Jeldahl Nitrogen (mg/L)

			0	.	5
--	--	--	---	---	---

 For Fluorides check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Metals check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE RECEIVED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT OF ENVIRONMENTAL RESOURCES

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 4

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

One sample collected

0	9
---	---

2	5
---	---

8	6
---	---

 Time

1	4	0	5
---	---	---	---

 NOTE: Use the 2400 Time System

FOR DEPT USE ONLY

Spring flow N/A Cu. ft/sec

--	--	--	--

Depth to water level 7.8 feet

--	--	--	--

Sampling depth 9.4 feet

--	--	--	--

Type of sample taken: Pump Bailer X

<u>NH₃ Nitrogen (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td><</td><td>0</td><td>.</td><td>1</td></tr></table>			<	0	.	1
		<	0	.	1		
<u>Total Solids (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>5</td><td>3</td><td>0</td></tr></table>				5	3	0
			5	3	0		
<u>Suspended Solids (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td>2</td><td>8</td></tr></table>					2	8
				2	8		
<u>Settleable Solids</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>0</td><td>.</td><td>1</td></tr></table>				0	.	1
			0	.	1		
<u>BOD₅ (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td><</td><td>1</td></tr></table>					<	1
				<	1		
<u>COD .25 N K₂Cr₂O₇ (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td>2</td><td>2</td></tr></table>					2	2
				2	2		
<u>Oil and Grease (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>N</td><td>1</td><td>L</td></tr></table>				N	1	L
			N	1	L		

For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X

For Metals check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 4

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	0	9
D	2	5
Y	8	6

 Time

1	4	0	5
---	---	---	---

NOTE: Use the 2400 Time System

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 7.8 feet

--	--	--	--

Sampling depth 9.4 feet

--	--	--	--

Type of sample taken: Pump Bail X

Total Iron (ug/L)

						N	A
--	--	--	--	--	--	---	---

Aluminum (ug/L)

						N	A
--	--	--	--	--	--	---	---

Manganese (ug/L)

						N	A
--	--	--	--	--	--	---	---

--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--

For Nitrate check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrite check one: 1. Colorimetric Method or 2. Atomic absorption X

NA - Not Available

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
1	0	0
4	8	5

 Time

0	8	4	5	

NOTE: Use the 24-Hr Time System

FOR DEPT. USE ONLY

Spring flow N/A Cu. Ft./sec.

--	--	--	--	--

Depth to water level 3.4 feet

--	--	--	--	--

Sampling depth 6.0 feet

--	--	--	--	--

Type of sample taken: Pump Sailer X

Temperature (°C)

			2	0	.	0			

pH

				6	.	9			

Alkalinity (mg/L)

			2	6	4	.	0		

Chloride (mg/L)

				4	4	.	8		

Fluoride (mg/L)

				6	.	2			

Total Phosphates as P (mg/L)

			<	0	.	0	1		

K-Jeldahl Nitrogen (mg/L)

			1	2	.	7			

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVIEWED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DEPARTMENT OF ENVIRONMENTAL RESOURCES

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring Point Number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Site sample collected

1	0
---	---

0	4
---	---

8	5
---	---

 Time

0	8
---	---

4	5
---	---

 NOTE: Use the
DATE TIME SYSTEM

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 3.4 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Valve X

NH₃ Nitrogen (mg/L)

		1	2	.	7
--	--	---	---	---	---

Total Solids (mg/L)

			3	8	0
--	--	--	---	---	---

Suspended Solids (mg/L)

				<	5
--	--	--	--	---	---

Settleable Solids

	T	R	A	C	E
--	---	---	---	---	---

BOD₅ (mg/L)

				1	4
--	--	--	--	---	---

COD .25 N K₂Cr₂O₇ (mg/L)

			1	2	0
--	--	--	---	---	---

Oil and Grease (mg/L)

					6
--	--	--	--	--	---

For Fluoride test use: 1. Colorimetric Method or 2. Selective Ion probe X

For Nitrate test use: 1. Colorimetric Method or 2. Atomic Absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

TS PREPARED
TS REVIEWED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)
FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE
Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 1

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

First sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	8	4	5
---	---	---	---

NOTE: Use the
24-Hour Time System

FOR DEPT USE ONLY

Spring flow N/A Cu. W/sec

--	--	--	--

Depth to water level 3.4 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Siphon X

Total Iron (ug/L)

		5	2	8	0
--	--	---	---	---	---

Aluminum (ug/L)

				A	E
--	--	--	--	---	---

Manganese (ug/L)

			<	1	0
--	--	--	---	---	---

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis: AE = ANALYTICAL ERROR

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19661

DATE PREPARED

DATE RECEIVED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	8	5	5
---	---	---	---

NOTE: Use the Date Time System

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 3.9 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Sailer X

Temperature (°C)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td>2</td><td>1</td><td>.</td><td>7</td></tr></table>			2	1	.	7
		2	1	.	7		
pH	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td>6</td><td>.</td><td>9</td></tr></table>				6	.	9
			6	.	9		
Alkalinity (mg/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td>5</td><td>5</td><td>.</td><td>0</td></tr></table>			5	5	.	0
		5	5	.	0		
Chloride (mg/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td>3</td><td>.</td><td>1</td></tr></table>				3	.	1
			3	.	1		
Fluoride (mg/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td>2</td><td>.</td><td>9</td></tr></table>				2	.	9
			2	.	9		
Total Phosphates as P(mg/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td><</td><td>0</td><td>.</td><td>0</td><td>1</td></tr></table>		<	0	.	0	1
	<	0	.	0	1		
K-Jeldahl Nitrogen (mg/L)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td>0</td><td>.</td><td>9</td></tr></table>				0	.	9
			0	.	9		

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

FORM 137 (Rev. 8-74)
 DATE PREPARED _____
 DATE RECEIVED _____

DEPARTMENT OF ENVIRONMENTAL RESOURCES
 WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
 (Red)
 FOR DEPARTMENT USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

Date sample collected 100485 Time 0855

NOTE: Use the back of this form

Spring flow N/A Cu. W/sec
 Depth to water level 3.9 feet
 Sampling depth 6.0 feet

Type of sample taken: Pump or X

NH ₃ Nitrogen (mg/L)	 0 . 4 0
Total Solids (mg/L)	 9 0
Suspended Solids (mg/L)	 1 0
Settleable Solids	 T R A C E
BOD ₅ (mg/L)	 2
COD .25 N K ₂ Cr ₂ O ₇ (mg/L)	 1 5
Oil and Grease (mg/L)	 < 5

For Fluoride test use: 1. Colorimetric Method or 2. Selective ion probe X

For Manganese test use: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

DATE PREPARED

DATE REVISED

QUARTERLY AND ANNUAL CHEMICAL
ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
(Red)

FOR DISAPPEARANCE USE ONLY

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 2

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Site sample collected

1	0
---	---

0	4
---	---

8	5
---	---

 Time

0	8	5	5
---	---	---	---

 NOTE: Use the
24-HR Time System

FOR DEPT USE ONLY

Spring flow N/A Cu. Ft./sec.

--	--	--	--

Depth to water level 3.9 feet

--	--	--	--

Sampling depth 6.0 feet

--	--	--	--

Type of sample taken: Pump Sucker X

Total Iron (ug/L)	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>6</td><td>0</td><td>0</td></tr></table>				6	0	0
			6	0	0		
Aluminum (ug/L)	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>A</td><td>E</td></tr></table>				A	E	
			A	E			
Manganese (ug/L)	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td><</td><td>1</td><td>0</td></tr></table>				<	1	0
			<	1	0		
	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						
	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						
	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						
	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis: AE = ANALYTICAL ERROR

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19761

E-3.1.2

DATE PREPARED

DATE REVIEWED

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

FOR DEPARTMENT USE ONLY

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 3

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

 Date sample collected

1	0	0	4	8	5

 Time

0	8	3	5		

 NOTE: Use the
 24-Hour Time System

 Spring flow N/A Cu. Ft./sec.

--	--	--	--

 Depth to water level 6.3 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

 Type of sample taken: Pump Sailer X

 Temperature (°C)

		2	0	.	0

 pH

		7	.		6

 Alkalinity (mg/L)

	1	5	5	.	0

 Chloride (mg/L)

		1	1	.	5

 Fluoride (mg/L)

			1	.	8

 Total Phosphates as P (mg/L)

	<	0	.	0	1

 K-Jeldahl Nitrogen (mg/L)

			1	.	0

 For Fluorides check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

8-000-107 (Rev. 8-74)

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 3

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--

 Date sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	8	3	5
---	---	---	---

 NOTE: Use the
 Date Time System

 Spring flow N/A Cu. W/sec

--	--	--	--

 Depth to water level 6.3 feet

--	--	--	--

 Sampling depth 100 feet

--	--	--	--

FOR DEPT. USE ONLY

 Type of sample taken: Pump Sucker X

 NH₃ Nitrogen (mg/L)

			0	.	2
--	--	--	---	---	---

Total Solids (mg/L)

			2	1	0
--	--	--	---	---	---

Suspended Solids (mg/L)

					5
--	--	--	--	--	---

Settleable Solids

	T	R	A	C	E
--	---	---	---	---	---

 BOD₅ (mg/L)

					2
--	--	--	--	--	---

 COD .25 N K₂Cr₂O₇ (mg/L)

				2	0
--	--	--	--	---	---

Oil and Grease (mg/L)

				<	5
--	--	--	--	---	---

 For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X

 For Manganese check one: 1. Colorimetric Method or 2. Atomic Absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

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 TO REVIEW

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL RESOURCES
 WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
 (Red)
 FOR DISPOSITION USE ONLY

Company Name BP OIL INC. County DELAWARE
 Type of Installation PETROLEUM REFINERY Municipality TRAINER
 Monitoring point number 3
 Facility Name IMPOUNDING POND
 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	8	3	5
---	---	---	---

NOTE: Use the DATE Time System

Spring flow N/A Cu. ft/sec.

--	--	--	--

 Depth to water level 6.3 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

FOR DEPT USE ONLY

Type of sample taken: Pump or X Bail

Total Iron (ug/L)

		3	1	4	0
--	--	---	---	---	---

 Aluminum (ug/L)

				A	E
--	--	--	--	---	---

 Manganese (ug/L)

			<	1	0
--	--	--	---	---	---

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X
 For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

AE = ANALYTICAL ERROR

Name and address of laboratory performing chemical analysis:
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19761

E-3.2.2

DATE PREPARED

DATE RECEIVED

 QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

FOR DEPARTMENT USE ONLY

 Company Name BP OIL INC. County DELAWARE

 Type of Installation PETROLEUM REFINERY Municipality TRAINER

 Monitoring point number 4

 Facility Name IMPOUNDING POND

 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

 One sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	9	0	5
---	---	---	---

 NOTE: Use the
 24-Hour Time System

 Spring flow N/A Cu. Ft./sec.

--	--	--	--

 Depth to water level 7.6 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

 Type of sample taken one: Pump Boiler X

 Temperature (°C)

		2	1	.	1
--	--	---	---	---	---

 pH

		7	.	4
--	--	---	---	---

 Alkalinity (mg/L)

	1	0	7	.	5
--	---	---	---	---	---

 Chloride (mg/L)

	9	3	.	3
--	---	---	---	---

 Fluoride (mg/L)

	2	.	2
--	---	---	---

 Total Phosphates as P (mg/L)

	<	0	.	0	1
--	---	---	---	---	---

 K-Jeldahl Nitrogen (mg/L)

	0	.	4
--	---	---	---

 For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X

 For Nitrate check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19061

USE OF 5197 (Rev. 8-82)
 DATE PREPARED
 DATE REVIEWED

DEPARTMENT OF ENVIRONMENTAL RESOURCES
 WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
 (Red)

Company Name BP OIL INC. County DELAWARE

Type of Installation PETROLEUM REFINERY Municipality TRAINER

Monitoring point number 4

Facility Name IMPOUNDING POND

Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Date sample collected

M	D	Y
1	0	0

H	M	S
4	8	5

 Time

H	M	S
0	9	0

5		

NOTE: Use the
 24-Hour Time System

Spring flow N/A Cu. W/sec

--	--	--	--

 Depth to water level 7.6 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

Type of sample collection device Pump Water X

<u>NH₃ Nitrogen (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td><</td><td>0</td><td>.</td><td>0</td><td>1</td></tr></table>		<	0	.	0	1
	<	0	.	0	1		
<u>Total Solids (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>3</td><td>2</td><td>7</td></tr></table>				3	2	7
			3	2	7		
<u>Suspended Solids (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td>5</td></tr></table>						5
					5		
<u>Settleable Solids</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td>N</td><td>I</td><td>L</td></tr></table>				N	I	L
			N	I	L		
<u>BOD₅ (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td>2</td></tr></table>						2
					2		
<u>COD .25 N K₂Cr₂O₇ (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td>1</td><td>0</td></tr></table>					1	0
				1	0		
<u>Oil and Grease (mg/L)</u>	<table border="1" style="display: inline-table;"><tr><td> </td><td> </td><td> </td><td> </td><td><</td><td>5</td></tr></table>					<	5
				<	5		

For Fluoride check one: 1. Colorimetric Method or 2. Selective Ion probe X

For Manganese check one: 1. Colorimetric Method or 2. Atomic absorption X

Name and address of laboratory performing chemical analysis:

Marcus Hook Refinery Laboratory

BP Oil Inc.

P.O. Box 428, Marcus Hook, Pennsylvania 19061

E-3.3.1

87-197 PA 1 87-
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COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL RESOURCES
 WATER QUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL
 ANALYSIS FOR IMPOUNDMENTS

ORIGINAL
 (Red)
 87-197 PA 1 87-

Company Name BP OIL INC. County DELAWARE
 Type of Installation PETROLEUM REFINERY Municipality TRAINER
 Monitoring point number 4
 Facility Name IMPOUNDING POND
 Facility Number

--	--	--	--	--	--	--	--	--	--	--	--

Sample collected

1	0	0	4	8	5
---	---	---	---	---	---

 Time

0	9	0	5
---	---	---	---

Spring flow N/A Cu. Ft./Sec.

--	--	--	--

 Depth to water level 7.6 feet

--	--	--	--

 Sampling depth 10.0 feet

--	--	--	--

Type of sample taken: Pump Other X

Total Iron (ug/L)

			1	7	5	0
--	--	--	---	---	---	---

 Aluminum (ug/L)

					A	E
--	--	--	--	--	---	---

 Manganese (ug/L)

			<	1	0
--	--	--	---	---	---

For Fluoride check one: 1. Colorimetric Method or 2. Selective ion probe X
 For Arsenic check one: 1. Colorimetric Method or 2. Atomic absorption X

AE ≡ ANALYTICAL ERROR

Name and address of laboratory performing chemical analysis:
Marcus Hook Refinery Laboratory
BP Oil Inc.
P.O. Box 428, Marcus Hook, Pennsylvania 19761

E-3.3.2

BP SLUDGE POND RECLAMATION
SLUDGE POND CORE BORING ANALYSIS

Boring No.	JGRA Sample No.	Percent Moisture	Percent Solids	Percent Ash		Percent Oil*	
				Wet Basis	Dry Basis	Wet Basis	Dry Basis
#1(0'-11')	0036	63.59	36.41	16.41	45.08	7.83	21.51
1(11'-18')	0037	58.92	41.08	22.12	53.85	6.32	15.38
1(18'-20')	0038	47.28	52.72	45.54	86.38	0.82	1.55
3(0'-8')	0046	67.96	32.04	16.10	50.25	3.69	11.51
5(0'-11')	0039	61.15	38.85	30.37	78.18	12.25	31.53
7(0'-8')	0040	61.78	38.22	24.58	64.31	8.63	22.59
10(0'-7')	0041	62.91	37.09	19.79	53.35	10.59	28.55
12(0'-10')	0042	59.29	40.71	30.31	74.46	2.09	5.14
13(0'-8')	0043	69.41	30.59	17.23	56.32	5.88	19.22
14(0'-8')	0044	64.38	35.62	24.59	69.04	4.40	12.36
16(0'-8')	0045	42.49	57.51	43.39	75.45	1.56	2.71

* Hexane Extractable Material

E-4.0

Boring No.	JGRA Sample No.	Copper		% By Weight Iron		Lead	
		Wet Basis	Dry Basis ¹	Wet Basis	Dry Basis	Wet Basis	Dry Basis
1 (0'-11')	0036	.018	.1096	1.12	5.825	.110	.6700
1 (11'-18')	0037	.022	.0995	2.40	10.850	.208	.9400
1 (18'-20')	0038	.004	.0088	2.32	5.094	.060	.1317
3 (0'-8')	0046	.023	.1429	1.44	8.944	.186	1.155
5 (0'-11')	0039	.022	.0724	1.36	4.478	.180	.5927
7 (0'-8')	0040	.016	.0651	2.40	9.764	.182	.7404
10 (0'-7')	0041	.009	.0455	1.44	7.276	.096	.4851
12 (0'-10')	0042	.022	.0726	1.84	6.071	.192	.6335
13 (0'-8')	0043	.018	.1045	4.64	26.930	.180	1.045
14 (0'-8')	0044	.031	.1261	2.96	12.037	.176	.7157
16 (0'-8')	0045	.040	.0922	2.72	6.269	.200	.4609

1. Dry Basis computations based on weight of ash in sample.

E-4.0.1

ORIGINAL
(Red)

Boring No.	JGRA Sample No.	Nickel		% By Weight Calcium		Vanadium	
		Wet Basis	Dry Basis ¹	Wet Basis	Dry Basis	Wet Basis	Dry Basis
#1 (0'-11')	0036	.003	.0183	2.420	14.75	.005	.0304
1 (11'-18')	0037	.012	.0542	.456	2.061	.005	.0226
1 (18'-20')	0038	.005	.0109	.126	.2767	.002	.0044
4 (0'-8')	0046	.004	.0248	.282	1.752	.007	.0435
5 (0'-11')	0039	.006	.0198	.212	.6981	.006	.0198
7 (0'-8')	0040	.003	.0122	.017	.0692	.005	.0203
10 (0'-7')	0041	.037	.1870	.190	.9601	.003	.0152
12 (0'-10')	0042	.005	.0165	.238	.7852	.007	.0231
13 (0'-8')	0043	.006	.0348	.602	3.494	.002	.0116
14 (0'-8')	0044	.009	.0366	.192	.7808	.005	.0203
16 (0'-8')	0045	.008	.0184	.368	.8481	.013	.0300

1. Dry Basis computations based on weight of ash in sample.

E-4.0.2

Boring No.	JGRA Sample No.	% By Weight					
		Sulfur		Potassium		Sodium	
		Wet Basis	Dry Basis ¹	Wet Basis	Dry Basis	Wet Basis	Dry Basis
#1(0'-11')	0036	.610	3.717	.080	.4875	.060	.3656
1(11'-18')	0037	1.370	6.193	.128	.5787	1.120	5.063
1(18'-20')	0038	.380	.8344	.166	.3645	.128	.2811
3(0'-8')	0046	1.030	6.398	.074	.4596	.184	1.143
5(0'-11')	0039	.470	1.548	.061	.2009	.136	.4478
7(0'-8')	0040	.520	2.116	.093	.3784	.096	.3906
10(0'-7')	0041	.230	1.162	.058	.2931	.264	1.334
12(0-10')	0042	.760	2.507	.117	.3860	.512	1.689
13(0'-8')	0043	.920	5.340	.054	.3134	.104	.6036
14(0'-8')	0044	.190	.7727	.072	.2928	.064	.2603
16(0'-8')	0045	1.130	2.604	.107	.2466	.384	.8850

1 Dry Basis computations based on weight of ash in sample.

ORIGINAL
(Red)

Boring No.	JGRA Sample No.	BTU/POUND	
		Wet Basis	Dry Basis ¹
#1(0'-11')	0036	3300.	20103.
1(11'-18')	0037	2890.	13065.
1(18'-20')	0038	830.	1822.
3(0'-8')	0046	NIL ²	
5(0'-11')	0039	4120.	13566.
7(0'-8')	0040	3300.	13426.
10(0'-7')	0041	2060.	10409.
12(0'-10')	0042	NIL ²	
13(0'-8')	0043	NIL ²	
14(0'-8')	0044	2060.	8377.
16(0'-8')	0045	3300.	7605.

1. Dry Basis computations based on weight of ash in sample.

2. Sample would not sustain combustion.

June 20, 1975

Commonwealth of Pennsylvania
Department of Environmental Resources
Region 1
1875 New Hope Street
Norristown, Pennsylvania 19401

RE: British Petroleum Company
Marcus Hook, Pennsylvania
Phase-Out of API Waste Lagoon

Gentlemen:

Chemfix, Inc., a Pennsylvania corporation, has been contracted by British Petroleum, Marcus Hook, Pennsylvania, to select subcontractors, implement a lagoon phase-out program, chemically-fix approximately 3.5 million gallons of API waste, and dispose of end products at state-approved landfills. Program scope includes an analytical survey of the waste and its reactivity with the Chemfix process; removal of trash and debris to state-approved landfills; construction of a diking system to direct all natural runoff to the plant oily waste sewer system during field work; and, upon disposal of the non-toxic, non-polluting Chemfix solids, restoration and contouring of the area to natural grade. Estimated starting date of the program will be on or about July 14, 1975.

Supporting analytical data and site plans locating the lagoons and the disposal area are included as Addendums. Project scope will be completed in five (5) phases as described in Addendum I.

We understand that this lagoon phase-out is a condition of British Petroleum's valid industrial waste permit. We are presenting this phase-out program summary and supporting documents for your review. We would appreciate a letter confirming that the program is acceptable.

THE ULTIMATE WASTE DISPOSAL PROCESS AND SERVICE

F-1.0

ORIGINAL
(Red)

June 20, 1975

Commonwealth of Pennsylvania
Department of Environmental Resources
Region 1
1875 New Hope Street
Norristown, Pennsylvania 19401

RE: British Petroleum Company
Marcus Hook, Pennsylvania
Phase-Out of API Waste Lagoon

Page 2

Subcontractors are now submitting bids for depositing the various end products in state-approved landfills. Lagoon debris and inert Chemfix solids are expected to be hauled to an approved landfill(s) in either Pennsylvania or New Jersey, depending on the bids. Lagoon bottom silt will be hauled to an approved landfill in New Jersey. We would appreciate a letter confirming that these landfills (noted in Addendum III) are acceptable.

Thank you for your attention and concern.

Sincerely,

Ronald J. Polosky
Technical Director

RJP/cks
Attachments

cc: B. McCrodden, British Petroleum

F-1.0.1

LIST OF ADDENDUMS

- | | | |
|---|---|--|
| I. Program Summary | - | Details the five phases of work and highlights environmental safeguards. |
| II. Site Plot Plan | - | Describes lagoon, piping, processing van locations, impounded solids discharge area, and diversion dikes. |
| III. Prospective Landfills | - | State approved landfill sites in either Pennsylvania or New Jersey from which bids have been solicited for (1) lagoon debris, (2) Chemfix solids as intermediate/secondary cover, and (3) lagoon bottom silt. Copies of available approval documents have been included. |
| IV. Chemfix Solids Leaching Data | - | Results of an accelerated leaching test on an actual sample of Chemfix treated BP lagoon sludge confirm the non-toxic, non-polluting nature of the Chemfix solids. |
| V. Recommendations for Loading and Hauling Chemfix Solids | - | To be included in bid specifications to subcontractors. |
| VI. Chemfix Landfill Improvement Patent (#3,841,102) | - | Describes the use of Chemfix solids as an improvement media in sanitary landfills. |
| VII. Use of Chemically-fixed Solids as Sanitary Landfill Cover Material | - | A technical report that confirms that Chemfix solids behave like natural soil in sanitary landfill situations. |
| VIII. Ultimate Disposal Methods of Refinery Sludges | - | A survey which includes Chemfix refinery waste experience. |

ADDENDUM I

Program Summary

Phase I

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill.

Phase II

To be accomplished in conjunction with or shortly after Phase I. The parking lot area due west of the lagoon will be excavated to form a series of dikes to contain the Chemfix solids for curing. On both the lagoon and disposal area sides, diking will be arranged to collect any natural or liquid runoff in order that it may be diverted to the refinery oily waste sewer system. All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be

maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the state's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills. An average of two feet of freeboard will be maintained. This specification prohibits the entire processing of the lagoon at one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the lagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul off sequence.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above.

The above Phases have been formulated based on our experience both in the field with jobs of similar scope, and in complying with regulatory requirements in seventeen (17) different states and with Federal E.P.A. requirements. British Petroleum recognizes its duty as a company to ensure compliance and to safeguard the environment.

ORIGINAL
(Red)

ADDENDUM III

Prospective Landfill Sites

PENNSYLVANIA

NEW JERSEY

1. Lagoon Debris

Knickerbocker Landfill
Paoli

Kin-Buc, Inc.
Meadow Road
Edison Township
Middlesex County

or

Lan-Chester Landfill
Honeybrook

or

Gross Landfill
Morrisville

2. Chemfix Solids
(as intermediate or
secondary cover)

Knickerbocker Landfill
Paoli

Kinsely's Landfill, Inc.
Route 41
Deptford Township
Gloucester County

or

Lan-Chester Landfill
Honeybrook

or

Gross Landfill
Morrisville

3. Lagoon Bottom Silt

None

Kin-Buc, Inc.
Meadow Road
Edison Township
Middlesex County

F-1.4

ORIGINAL
(Red)

ADDENDUM IV

Chemfix Solids Leaching Data

F-1.5

ORIGINAL
(Red)

BRITISH PETROLEUM COMPANY

Marcus Hook, Pa.

SW: 844-F75

Preliminary Leaching Study

LAB LEACHATE OF 6/9/75 LABORATORY CHEMFIX PRODUCT

<u>Constituents</u>	<u>Raw Sludge</u>	<u>Inches of Leachate Water⁰</u>			
		<u>0-25"</u>	<u>25-50"</u>	<u>50-75"</u>	<u>75-100"</u>
Cadmium (Cd)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Chromium (Cr)	45	< 0.10	< 0.10	< 0.10	< 0.10
Copper (Cu)	38	< 0.25	< 0.10	< 0.10	< 0.10
Iron (Fe)	3400	< 0.25	< 0.10	< 0.10	< 0.10
Lead (Pb)	46	< 0.25	< 0.10	< 0.10	< 0.10
Nickel (Ni)	17	< 0.50	< 0.10	< 0.10	< 0.10
Zinc (Zn)	350	< 0.10	< 0.10	< 0.10	< 0.10
Phenol (Ø) and related	4.0	< 0.25	< 0.10	< 0.10	< 0.10
Cyanide (CN) and related	< 0.25	< 0.25	< 0.10	< 0.10	< 0.10
Chemical Oxygen Demand (COD)	21,000	3600	2600	2300	1800

All Results in ppm

⁰ = Each 25" of leachate represents approximately 800cc of distilled water

< = Less Than

The above data is supplied for information purposes only. Since raw wastes vary considerably, other samples of this waste may yield somewhat different results.

F-1.6

ORIGINAL
(Red)

ADDENDUM V

Recommendations for Loading and Hauling Chemfix Solids

1. While the physical properties of Chemfix solids depend on the waste treated and the amount of Chemfix reagents added, normal Chemfix solids will behave like natural soils, from silt to clay. Often, clients will ask that additional amounts of reagents be added for harder solids, with unconfined compressive strengths exceeding 5 T/ft². Chemfix solids will also behave like soil in that they may become somewhat dusty in very dry weather or somewhat muddy in very wet weather.
2. When loading Chemfix solids, it is recommended that equipment work from the natural soil areas surrounding Chemfix impounded discharge areas. This allows operators to work on material that they are completely familiar with. Good results have been obtained in loading by large backhoes, which dip into the as-cast solids and deposit them into hauling trucks.
3. In any case, the loading equipment should move to the Chemfix solids. The Chemfix should not be herded or pushed about unnecessarily in the disposal area; Chemfix solids are often impounded in low wet areas which may muddy if disturbed.
4. During very wet weather, it may be advantageous to pile up Chemfix solids before loading into hauling trucks to allow impounded rain water to drain.
5. Plastic or dirt should be used to minimize leakage of trace water from hauling truck tailgates.
6. C-clamps or "boomer chains" on the truck tailgates will help to prevent leakage of trace water. They will also prevent tailgates from accidentally opening during transport to landfill.
7. When dumped at the landfill, the Chemfix solids should be dumped as close as possible to their final resting place to minimize landfill handling costs. Best results are obtained when solids are allowed to sit undisturbed for one day to a week before subsequent movement.

F-1.7

Slurry Systems Specialists, Inc.

CONTRACTORS & CONSULTANTS



• P.O. BOX 364
EAST CHICAGO, INDIANA 46312
PHONE:
219-949-0561

SPECIFICATIONS

SLURRY CUTOFF WALL VIBRATING-BEAM INJECTION METHOD

SECTION SCOPE

This section of the Specification includes requirements for the vibrating beam injection slurry cutoff wall, as hereinafter specified or as required to properly complete the WORK:

1. GENERAL

- 1.1 A vibrated beam slurry wall shall be constructed to the lines, grades, and cross sections as indicated on the drawings. Wall shall be essentially vertical. An approved slurry mixture shall be pumped under controlled pressure through the underlying stratas and keyed into an impervious material.
- 1.2 The Contractor will be required to submit evidence that he is competent to construct a slurry wall. This evidence will insure that the Contractor or his subcontractor will have sufficient competent personnel to carry out the operations specified, and such personnel (as approved by Purchaser prior to award of Contract) will have previous experience in this type of construction. In particular, a construction and slurry specialist (s) shall be used to supervise the construction, slurry preparation, and quality control.

2. DRIVING AND EXTRACTION OF VIBRATING BEAM

2.1 Equipment:

- a. The slurry wall shall be constructed using suitable equipment for attaining required depth and continuity of the wall.
- b. Vibrating beam shall have a web depth of 20 to 33 inches and a flange width of 10 to 15 inches. Beam shall be controlled by guide leads assuring plumbness in vertical plane within the limits of $\pm 1\%$ and each insertion shall overlap previous insertion be a minimum of 10% of beam depth.



F-2.0

ALL TYPES OF SLURRY TRENCHES & WATER BARRIERS

- c. Beam shall be inserted by vibratory driver at maximum rate and extracted at the rate of 3m per minute. Pumping pressure of slurry shall be as such to maintain a trench level and full around the beam during extraction. Beam shall be "Keyed" into clay or terminated at the top of an impervious rock-like strata.

2.2 Installation of Slurry Wall

- a. Contractor shall construct a suitable working area on top of dike to provide free mobility of equipment and at all times maintain stability and appearance of dike embankment during construction of slurry wall. Any damage to the dike shall be immediately repaired to the satisfaction of Purchaser. This applies if design specifies slurry wall through the dike.
- b. Driving and extraction of vibratory beam and introduction of slurry into the pervious soil shall begin after construction of dike, providing design specifies slurry wall from the top of dike. Crane with vibrated beam insertion equipment shall travel along the top of the dike. All other support equipment shall travel along the toe of the slope or on top of dike preceding or following crane.
- c. The complete slurry wall shall be plastic and continuous with no gaps and shall have a minimum thickness of 3 inches or less depending on seepage requirement.

3. SLURRY

- 3.1 Slurry shall consist of a stable colloidal suspension of pulverized natural sodium-cation bentonite and cement in water.
 - a. Bentonite: High quality pulverized natural sodium-cation material. A written certification shall be supplied specifying the quality per each load shipment of bentonite received. Additives, if any, must be as approved by Consulting Engineer.
 - b. Bentonite shall comply with American Petroleum Institute Standard 13A Sec. 3, 5, 6, & 7, with the following exceptions:
 - b.1.1. Elimination of the yield point plastic viscosity relationship.
 - b.1.2. Use 28 grams of clay instead of 22.5 grams.

ORIGINAL
(Red)

- c. Cement: Portland Cement ASTM C150 type 1 or 1-S. A written certificate specifying cement quality shall be given by cement supplier for each tank load shipment of cement received.

3.2 Slurry Requirements

- a. At time of injection, slurry for walls shall meet the following requirements:
 - a1. Permeability of not more than $K=10^{-7}$ cm/sec. or less than $K=10^{-6}$ cm/sec.
 - a2. Viscosity of not less than 35 marsh cone seconds in accordance with API RP-13B.
 - a3. Minimum slurry mixture temperature shall be 45° F.
 - a4. Yield of not less than 70 bbl. of 15 cp mud per ton of Bentonite.
 - a5. The water loss shall not be greater than 50 cubic centimeters in 20 minutes at 50 psig when tested in accordance with "Low Temperature Filtration Test" API RP-13B.
 - a6. The specific gravity of the slurry shall not be less than 1.07 gm per cubic centimeter, nor greater than 1.5 gm per cubic centimeter or as approved by the Consulting Engineers.
 - b. Contractor shall be responsible for meeting all above requirements. Completed wall sections failing to meet these requirements shall be repaired immediately to the satisfaction of the Purchaser.
- 3.3 Contractor shall submit a written statement as to the use of any additional admixtures, such as retarders, and its effect on the slurry mixture prior to its use.
- 3.4 Slurry shall be pumped from centrally located mixing plant to a holding tank equipped with a constant agitator only after bentonite cement mix has been fully hydrated as determined by Purchaser.

4. MIXING PLANT:

- a. All slurry for vibrating beam injection shall be mixed in a colloidal continuous mixing. Mixing of water, bentonite, and cement shall continue until bentonite particles are fully hydrated and resulting water, cement and bentonite slurry is homogenous.

- b. Slurry plant shall include necessary equipment including a mixer capable of producing a colloidal suspension of bentonite and cement: sumps, pumps, valves, hoses, supply lines, small tools, and all other equipment as may be required to adequately supply slurry to storage tank.

5. WATER

Water shall be clean, fresh, and free from oil, acid, alkali, organic matter, or other deleterious substances. Contractor shall supply all the required water. Contractor is responsible for changes in the water chemistry and its effect on the cement-bentonite mixture.

- 5.1 Laboratory slurry mix design shall be submitted to Purchaser or Purchasers Representative prior to construction of slurry wall start up.

6. TREATMENT OF TOP OF SLURRY WALL

- 6.1 Whenever temperatures are anticipated to be 32⁰ F or less, suitable cover, as approved by Purchaser's Representative, shall be placed over the slurry wall to prevent freezing.

7. LABORATORY FOR SLURRY TESTING

- 7.1 Contractor shall have portable laboratory on the project.
- 7.2 Qualified person shall manage and operate laboratory.
- 7.3 At least two times per shift, tests shall be conducted to prove to Purchaser or Consulting Engineers that mixed slurry shall meet all requirements as outlined under 3.1 Slurry & 3.2 Slurry Requirements.



BP OIL INC.

*Reviewed
12-2-76
Subm. Had Ings.
Satisfactory
Gony.*

ORIGINAL
(Red)

P. O. BOX 428, MARCUS HOOK, PA. 19061 PHONE (215) 494-360
TELEX 83-472

November 29, 1976

RECEIVED

DEC 2 1976

ENVIRONMENTAL PROTECTIONS
WATER QUALITY DIVISION
NORRISTOWN REGIONAL OFFICE

Mr. Dave Milhous
Sanitary Engineer, PaDER
1875 New Hope Street
Norristown, Pennsylvania 19401

Re: Impounding Pond Permit Application

Dear Mr. Milhous:

As you requested, additional information concerning the proposed slurry wall for the refinery's impounding pond is included. The areas in which you expressed concern were:

- 1) Will the Bentonite slurry mixture react adversely with the oil likely to be present in the groundwater or in the impounded water?
- 2) What is the expected permeability of the slurry wall?

Laboratory testing was performed on surface and sub-surface groundwater, water to be impounded, and water from Marcus Hook Creek to determine respective reactions with the Bentonite. Attached are copies of letters from Slurry Systems Specialists, Incorporated, the installation contractor, and International Minerals and Chemical Corporation, the testing Laboratory, assuring the suitability of the proposed Bentonite mixture.

The permeability of the proposed slurry wall will be 10^{-7} cm/second.

Your cooperation in expediting the above referenced application is sincerely appreciated. It is hoped the information supplied herein will be sufficient to allow

F-2.4

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Mr. Dave Milhous

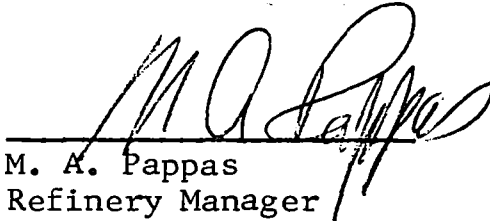
November 29, 1976

Re: Impounding Pond Permit Application

final approval of the permit application.

Very truly yours,

BP OIL, Incorporated


M. A. Pappas
Refinery Manager

FPP:rl

Attachment

F-2.5

Slurry Systems Specialists, Inc.

CONTRACTORS & CONSULTANTS



• P.O. BOX 364
EAST CHICAGO, INDIANA 46312
PHONE:
219-949-0561

November 23, 1976

J. E. Brenneman
211 South Broad St.
Philadelphia, Pa. 19107

Attn: Mr. Robert Seybold:

Re: Vibrated Beam Slurry Wall
B P Oil Co.

The field water as tested shows no adverse affects to a Bentonite Cement Water Barrier Wall. We, therefore, are confident such a wall will more than satisfy your needs.

Transmitted, herewith, is a copy of the Water Analysis and a Non Disclosure Agreement. We would like you to review and comment for signature on both before or during our next visit.

We are presently mobilizing for two (2) jobs in our area. If you or your people are interested they would be available for inspection in the near future.

Per phone conversation of November 22, 1976, the following basic mix information is submitted.

QUANTITY: 1 m³

55 Kg Bentonite (Premium grade Wyoming)

110 Kg Cement (Type I Portland)

1.1 Kg M77 Adduct for Filtrate Loss Control

Soda Ash as required.

937 liters of H₂O (Portable ar acceptable)

The above mix proportions will have to be modified slightly in the field to adjust for variations in Bentonite and Water Quality.

Transmitted, herewith, is one (1) copy of the Water Analysis and a typical Cement Analysis.

See your soon.

Very truly yours,
SLURRY SYSTEMS SPECIALISTS, INC.

Not responsive due to revised scope

President

FS/rca

ALL TYPES OF SLURRY TRENCHES & WATER BARRIERS



F-2.6

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INTERNATIONAL MINERALS & CHEMICAL CORPORATION

November 17, 1976

Not responsive due to revised scope
Slurry Systems Specialists, Inc.
P. O. Box 364
East Chicago, Ind. 46312

Dear Not responsive at:

Below you will find the results so far gained on the water samples you submitted. We did not run the potable water.

Sample 1 is Surface H₂O Oct. 15/76
Sample 2 is Hook Creek prior to High Tide
Sample 3 is Svege Basin BP Oil
Sample 4 is Sub Surface Ground Water

Sample	1	2	3	4
Na	3.0 ppm	3.1 ppm	372 ppm	120 ppm
Ca	11.3 "	22.7 "	45 "	195 "
Cl	not done	-	-	-
K	1.02 ppm	4.1 "	11.2 "	12.6 "
SO ₂	not done	-	-	-
Oil & Grease	0 ppm	16.4 "	53 "	545 "

We see nothing here which would effect your type of barrier.

I am told the oil and grease are partially emulsified. It may pay for these people (if they are not already doing it) to add a "breaker" to the water. With this most of the oil and grease would be at the top and then be treatable and/removable.

If you have any questions please contact me,

Sincerely,

Not responsive due to revised scope

Clay Minerals Specialist

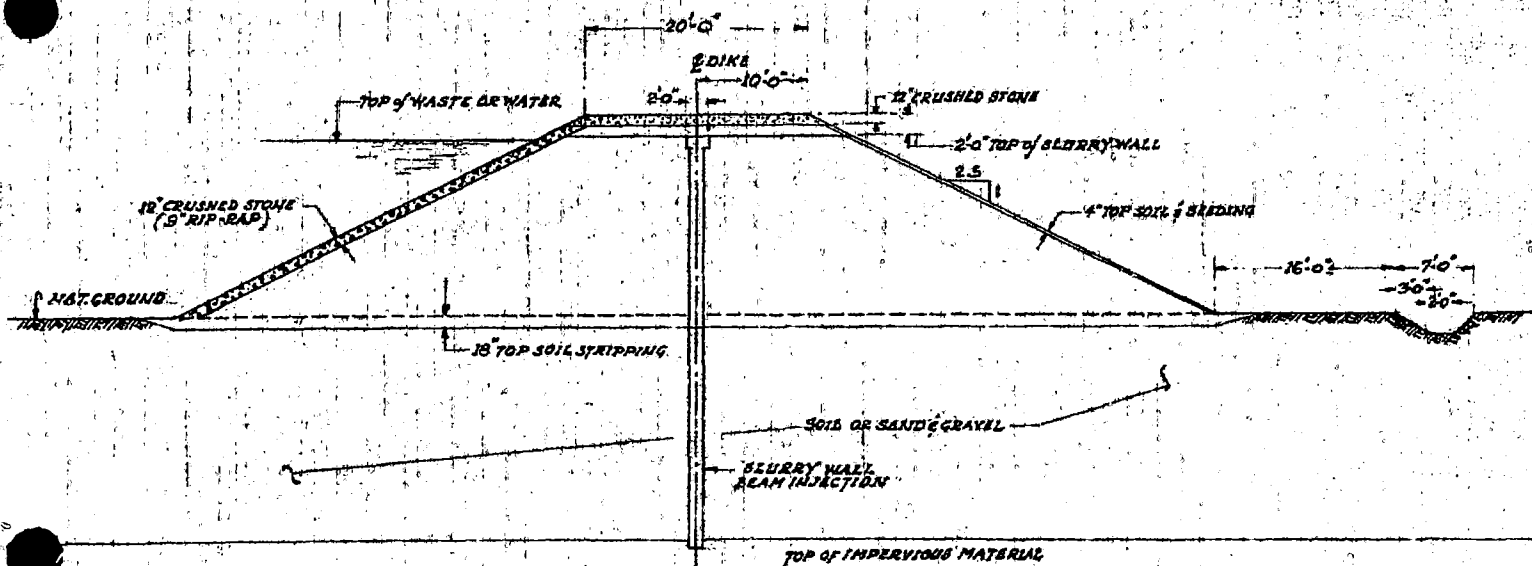
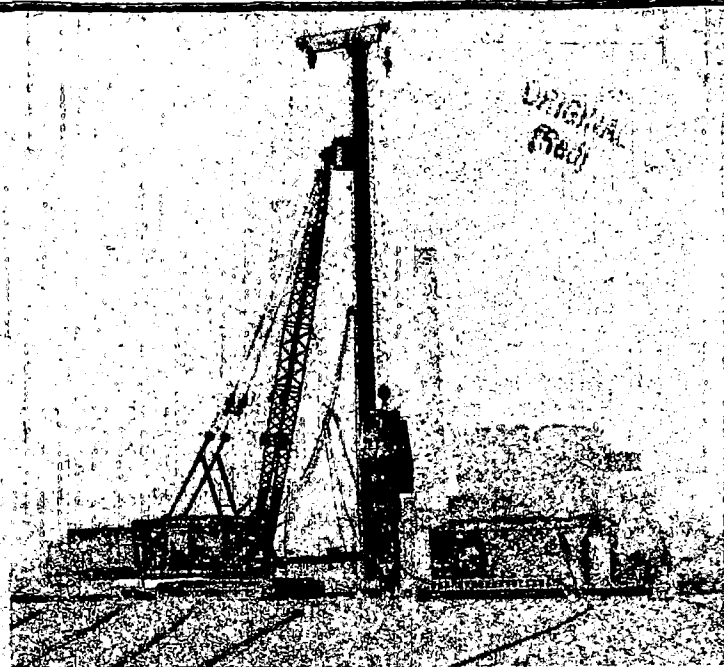
DH:kf

cc:

Not responsive due to revised scope

F-27

First Water Cutoff Wall Injected Into US Soil On Big Power Plant Job



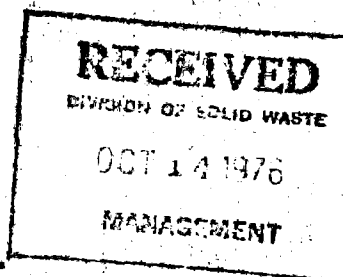
~ SECTION THROUGH DIKE WALL ~



Slurry Systems Specialists, Inc.
CONTRACTORS & CONSULTANTS

• P.O. Box 364
EAST CHICAGO, INDIANA 46312

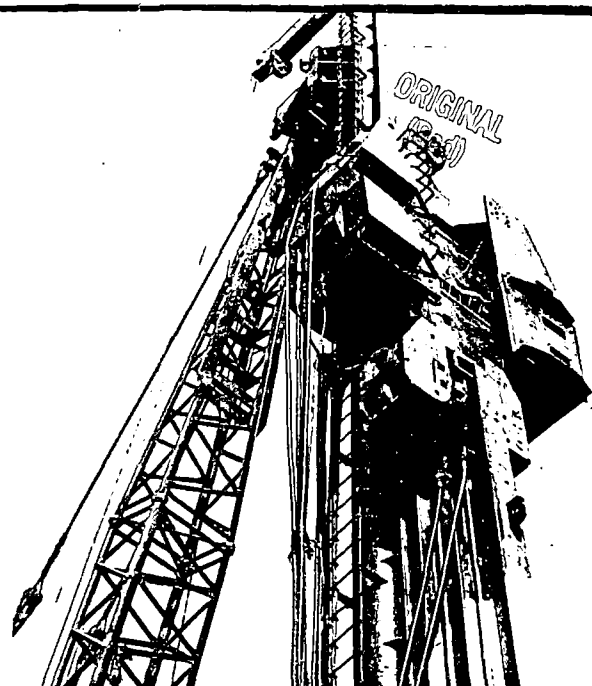
PHONE:
219-949-0561



F-2.8

Batch plant is a high volume production unit using jet and shearing principles. Slurry is pumped through 4 inch PVC hose up to 2200 feet to injection unit.

Largest commercial vibrator in America drives injection I-beam into ground. Slurry pipes and feed lines are mounted below vibrator.



New vibrated beam slurry system gives higher impermeability at lower cost

A revolutionary method of injecting water impermeable walls into the earth is being used for the first time in America on a new power plant in northern Indiana. The contract is being performed by Thatcher-Holzman, a joint venture, and is 90% completed with more than 24,000 lineal feet installed. Total square footage of the wall is approximately 1,100,000 with average depths of 45 feet down to a natural, impervious layer.

The new wall is being installed to conserve water and prevent pollution in the power plant's retention basins.

Used successfully for more than 15 years in Europe, the vibrated beam method offers a k-value of 10-7 cm/sec compared to slurry trench method of only 10-5 cm/sec. Installation is faster with greater accuracy and far thinner walls,

with resulting savings in labor, equipment and slurry material.

More than 50,000,000 square feet of similar water cutoff walls has been installed in Europe preventing inflow or underflow on dikes, levees, dams, irrigation canals and cofferdams. Now, the geotechnical engineer in America has at his disposal a water barrier system which is efficient, superior in quality and relatively low in cost.

A new company, Slurry Systems Specialists Inc has been formed to install water impervious walls on any project in America. For more information about the power plant project or to find out how the new technique might work on your next project, please call or write Slurry Systems.

33-inch-wide injection beam enters ground. Lateral and vertical guides assure accurate penetration. Slurry is pumped during driving and extraction.

Excavated section of test wall after 10 months installation shows insitu condition of wall to be in perfect condition, still moist and pliable.

F-2.9



RECEIVED
DIVISION OF EMERGENCY & REMEDIAL RESPONSE

JUL 14 1987

Waste Management